NEW SERIES, No. 5. MARCH, 1889.

PUBLICATIONS OF THE

AMERICAN

STATISTICAL ASSOCIATION.

I. NOTES ON THE STATISTICAL DETERMINATION OF THE CAUSES OF POVERTY. By Amos G. Warner, Ph.D.
REMARKS by Rev. Samuel W. Dike, LL.D.
II. STATISTICS OF DIVORCE IN THE UNITED STATES AND EUROPE. By Rev. Samuel W. Dike, LL.D.
III–X. Miscellany: Fox's Regimental Losses in the American Civil War; Smith's Statistics and Economics; Gilman's Profit-Sharing; State Hand-Books; Anthropological Records; Swank's Iron and Steel Report for 1888; Adams's Uniform Railway Statistics; Statistics of the American Navy.

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CONSTITUTION

OF THE

AMERICAN STATISTICAL ASSOCIATION.

ARTICLE I. This Association shall be denominated the AMERICAN STATISTICAL ASSOCIATION.

ART. II. The objects of the Association shall be to collect, preserve, and diffuse statistical information in the different departments of human knowledge.

ART. III. The Association shall be composed of Fellows and Honorary Members.

ART. IV. All members shall be chosen by ballot; nomination for membership shall first be submitted to the Board of Directors; if approved by them, the names shall be presented to the Association, and for election the affirmative votes of four fifths of the members present shall be necessary. Each Fellow shall pay annually two dollars, or twenty dollars at some one time.

ART. V. Fellows only shall be entitled to vote, but Honorary Members shall have the right to sit and deliberate in all the meetings of the Association.

ART. VI. The officers of the Association shall be a President, five Vice-Presidents, a Recording Secretary, a Corresponding Secretary, a Treasurer, a Librarian, and three Counselors, who, together with the President and Secretaries, shall form a Board of Directors for the government of the institution, three of whom shall constitute a quorum at any meeting regularly convened. There shall be also three Standing Committees of three members each, namely, on Publication, on Finance, and on the Library.

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ART. VIII. No alteration in this Constitution shall be made except on notice at a previous meeting, and by a vote of three fourths of the members present.

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AMERICAN

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Presented to the AMERICAN STATISTICAL ASSOCIATION, April 25, 1889.

NOTES ON THE STATISTICAL DETERMINATION OF THE CAUSES OF POVERTY.

BY AMOS G. WARNER, PH. D.

Lecturer in Economic and Political Science in the University of Nebraska.

The analysis given below was worked out by non-statistical methods, but yet represents something more than a philosophical study of the subject. It was elaborated while the author was General Agent of the Charity Organization Society of Baltimore, and its adequacy tested by continued reference to concrete cases of destitution. The analysis in its skeleton form has appeared elsewhere, and is reprinted here not because it is thought to be anything final or of great practical value, but because it gives a bird's-eye view of a large and ill-mapped field which statisticians are only beginning to explore.

Most of those who have definitely undertaken a statistical search for the causes of poverty have merely employed some system of case-counting. They have considered a large number of cases, one by one, and assigned to each whatever cause of poverty seemed to be of most importance. A glance at our analysis of causes will show that such a method would be likely to exaggerate the importance of the subjec-

ANALYSIS OF THE CAUSES OF POVERTY.

- SUBJECTIVE.
  - Characteristics.
    1. Undervitalization and indolence.
    2. Lubricity.
    3. Specific disease.
    4. Lack of judgment.
    5. Unhealthy appetites.
  - Habits producing and produced by the above.
    1. Shiftlessness.
    2. Self-abuse and sexual excess.
    3. Abuse of stimulants and narcotics.
    4. Unhealthy diet.
    5. Disregard of family ties.
- OBJECTIVE.
  1. Inadequate natural resources.
  2. Bad climatic conditions.
  3. Defective sanitation, etc.
  4. Evil associations and surroundings.
  5. Defective legislation and defective judicial and punitive machinery.
  6. Misdirected or inadequate education.
  7. Bad industrial conditions.
     - *a.* Variations in value of money.
     - *b.* Changes in trade.
     - *c.* Excessive or ill-managed taxation.
     - *d.* Emergencies unprovided for.
     - *e.* Undue power of class over class.
     - *f.* Immobility of labor.
  8. Unwise philanthropy.

tive as compared with the objective influences. In dealing with individuals their character is more studied than their environment. Even when environment is the primary cause of poverty, the immediate cause, or a co-ordinate result, is often deterioration of character. Sickness is more obvious than bad sanitation, laziness than a malarial atmosphere, inefficiency than a defective educational system. The one who attempts the analysis of cases is also confused by the fact that under the operation of exactly similar general causes some families are destitute and some are not. One man is able to secure an adequate income under the most adverse circumstances,— bad climate, bad housing, bad taxing, no opportunities for education, etc. Another man, under exactly the same conditions, will become destitute, and the

observer concludes that the final and determining cause must be something in the physique or character of the latter person. The ministers and charity agents who come most intimately in contact with the poor are very prone to take short-sighted views of the causes of poverty.

We premise, then, that a statistical analysis of a concrete mass of poverty or pauperism will probably give more light concerning the subjective causes of poverty than the objective. Such we will find to be the case as we review the work that has been done in this line. It is useful, and need not be misleading, if its limitations are remembered. We must recollect that we are enumerating immediate and not primary causes. On the other hand, it may be said that those who study the question from a philosophical standpoint are apt to lay too much stress on the influence of institutions and of our surroundings. Thus, Mr. George thinks that a modification of the tax system would abolish poverty, and the socialists generally think that a change of institutional environment is the one thing needful. In the western part of this country one has an opportunity to see how character alone, in spite of the most auspicious, natural, and institutional conditions, may beget and perpetuate degradation and pauperism. The questions of character are very far from insignificant. In the statistical work which this paper reviews the method almost exclusively used is that of case-counting; and the results, for the most part, bear only indirectly upon the great primary questions of environment.

The first question in considering tables of this sort is as to the class of families whose cases have been examined. We will consider five collections of figures gleaned from the study of as many different classes of people. First, 528,257 cases of those receiving public relief in Prussia; second, some of the results reached by Mr. Charles Booth in studying the entire population of East London, numbering about 1,000,000 souls; third, 27,970 cases of those who asked for relief, and were investigated by the Charity Organization

Societies of this country; fourth, 6197 cases relieved by either public or private agencies of Buffalo, N. Y., and investigated by the Charity Organization Society of that city; and, fifth, the facts gathered by O. C. McCulloch, of Indiana, and R. L. Dugdale, of New York, regarding certain large and persistently pauper families.

The Table given below is condensed and re-arranged from one given on pages 366-7 of the "statistisches Handbuch für den preussischen Staat," 1888. The figures are based upon the records of public poor relief in Prussia for the year 1885. Both in-door and out-door dependents are included.

Table I. CAUSES OF DESTITUTION.

(From the Records of Prussian Public Poor Relief, 1885.)

	Ortsverbände.				Landarmenverbände.	Total.	Per ct. of all cases.
	Städte.	Landgemeinden.	Gutsbezirke.	Gem. Verbände.			
ACCIDENTAL.							
Fault of dependent..	6,063	3,692	1,022	667	204	11,648	2.2
Fault of bread-winner	202	178	47	25	9	461	.09
Death of bread-winner	736	1,284	279	271	27	2,547	.5
NON-ACCIDENTAL.							
Death of bread-winner	40,569	30,088	8,400	5,705	1,190	86,021	16.3
Sickness.	119,248	20,410	1,931	3,889	5,001	150,479	28.5
Infirmity, or physical defects.....	39,523	26,572	4,182	5,305	9,233	84,815	16.
Infirmity of age.....	64,784	40,373	10,780	9,452	1,287	126,685	24.
Large No. of children...	7,433	2,849	358	406	350	11,396	2.1
Lack of employment...	10,713	3,184	93	480	110	14,580	2.8
Intemperance.....	3,406	2,747	213	525	49	6,940	1.3
Indolence.....	1,181	1,332	141	245	45	2,944	.6
Other causes.....	19,305	7,384	693	1,488	783	29,713	5.6
Undetermined causes..	24	4				28	.01
Total	313,247	140,047	28,148	28,458	18,357	528,257	100.00

A very cursory examination of the causes here tabulated will show how doubtful must often be the decision between them. Is a man so indolent that no one will employ him, or are there causes, external to himself, that render him idle? While under the influence of liquor he breaks his leg,—is

the cause to be given as intemperance or accident? A man is not very strong, and has a rather large family,—shall the cause be given as infirmity or large number of children? The personal equation is necessarily large. A radical "prohibitionist" would get very different results than would a "moderate drinker." Under similar difficulties Mr. Booth expresses the hope that the prejudices of different observers will cancel each other; but where possible error is so large a factor in the amount involved, the results can only be reasoned from with extreme caution. A large number of minor rules of classification — statistical by-laws, perhaps — have to be elaborated, and it is only as such regulations come to be codified and generally understood that the results are at all reliable. It is safer to make allowance for a general and ascertained error than to trust blindly to the mutual effacement of unascertained mistakes. The writer is not sufficiently conversant with the methods of German officials to feel safe in "running correction lines,"—if any are needed.

Mr. Charles Booth, of England, has made an heroic attempt to draw a statistical picture of industrial society in East London. A preliminary study of the subject is published in the fiftieth and fifty-first volumes of the *Journal of the Royal Statistical Society*, under the title "Condition and Occupation of the People of East London and Hackney." A further and completer presentation of the matter is promised in book form.* He divides the entire population, amounting to about one million, into forty sections, according to occupation; and into eight classes, according to income. The names given the different sections sufficiently explain themselves. The characterization of the classes (A to H) must be given rather more fully. Inmates of institutions are not included in the enumeration. The exact

* Mr. Booth obtains his information from the school-board visitors of the districts investigated. The fundamental assumptions and other sources of possible error that his method involves are frankly stated by himself, but need not be repeated here, except as they may affect certain results with which we are concerned.

number of the population whose condition is canvassed is 891,539.

A. *The Lowest Class.* Loafers, semi-criminals, a proportion of the street sellers, street performers, and others. This class, in the district covered, numbers 10,979, or about 1.23 per cent of the whole population. The class is very difficult to enumerate, and Mr. Booth's method of work increases the difficulties.

B. *Casual Earnings.* "These people, *as a class*, are shiftless, hand-to-mouth, pleasure-loving, and always poor." They number 100,062, or about 11.22 of the total.

C. *Intermittent Earnings.* A pitiable class, consisting largely of struggling, suffering, helpless people. They are, more than any others, the victims of competition, and on them falls, with peculiar severity, the weight of recurrent depressions of trade. They number 74,247, or about 8.33 per cent of the whole number.

D. *Regular Minimum Earnings.* The income of a family in this class is from 18 shillings to 21 shillings per week. "They live hard lives very patiently." They number 128,887 persons, or about 14.46 per cent of the total.

Class E includes those receiving "ordinary standard earnings;" F, "highly-paid work;" G, "lower middle class;" H, "upper middle." With the last four we need not further concern ourselves.

Mr. Booth characterizes class B as "the very poor," and class D as "the poor." Class C contains some to be properly described by each of these two terms. The arbitrary standard of a weekly income of 20 shillings to mark the line of poverty has been criticised by some as too high, and by others as too low. Mr. Booth continues to be satisfied with the standard as given. He suggests that in class C wise and systematic charity can probably be of greater use than in the others, and that state-aided technical education would probably do much for class D. It will be observed that the three classes, B, C, and D comprise 303,196 persons, of whom more than 100,000 are "very poor."

His second classification of the same population is by "sections," and is given herewith in per cents. [In all these tables the territorial classification is eliminated as not instructive for American readers.]

Table II. BOOTH'S CLASSIFICATION, BY SECTIONS, OF POPULATION OF EAST LONDON AND HACKNEY.

			Per cent of whole Population.	
1	Lowest class			1.0
2	Casual labor	Labor.	22.3	4.8
3	Irregular labor			2.4
4	Regular work — low pay			4.4
5	Regular work — ordinary pay			8.7
6	Foreman, etc			2.0
7	Building trades	Artisan.	23.0	5.7
8	Furniture, wood work, etc			7.3
9	Machinery and metals			4.0
10	Sundry			6.0
11	Dress		9.0	6.6
12	Food preparation			2.4
13	Railway	Other wage earners.	9.0	1.1
14	Roads			1.1
15	Shop assistants			2.4
16	Sub-officials			1.4
17	Seamen			1.2
18	Other wage-earners			1.8
19	Home industries	Small profit earners.	10.7	2.2
20	Small employers			2.7
22	Street sellers			1.7
23	General dealers			1.1
24	Small shops			2.7
26	Coffee Houses			0.3
21	Large employers	Large profit earners.	2.8	0.3
25	Large shops			1.8
27	Licensed houses			0.7
28	Clerks, etc		5.3	4.3
29	Sub-professional			1.0
30	Professional			0.5
31	Ill, or no occupation			0.3
32	Independent			0.2
33	Semi-domestic	Female heads of families.	3.7	1.7
34	Dress			0.8
35	Trades			0.6
36	Employing and professional			0.1
37	Supported			0.3
38	Independent			0.2
39	Other adult women			7.7
40	Unscheduled houses			4.5
				100.0

Then follow three tables showing how the different classes are made up from the various sections. Of course section one corresponds with class A.

Table III. BOOTH'S TABLE SHOWING THE FORMATION OF CLASS B, FROM THE VARIOUS SECTIONS.

		Sections.	Total.
Casual	Labor.	2	41,307
Irregular	Labor.	3	4,541
Regular	Labor.	4 and 5	1,496
Building and furniture	Artisans.	7 and 8	10,836
Machinery and sundry	Artisans.	9 and 10	4,504
Dress and food	Artisans.	11 and 12	7,094
Other wage-earners		13–18, 28, 29	3,240
Home industries		19 and 20	1,873
Street sellers, etc		22, 24, and 27	4,032
Ill, and no occupation		31	2,044
Female heads of families with young persons and children		33–35, and 37	11,296
Total			92,263
Female adults, not heads of families, variously employed			7,799
Total of Class B (very poor)			100,062

Table IV. BOOTH'S TABLE SHOWING THE FORMATION OF CLASSES C AND D, FROM THE VARIOUS SECTIONS.

		Sections.	Total.
Casual	Labor.	2	1,198
Irregular	Labor.	3	15,275
Regular	Labor.	4 and 5	49,416
Building and furniture	Artisans.	7 and 8	30,698
Machinery and sundry	Artisans.	9 and 10	17,200
Dress and food	Artisans.	11 and 12	26,931
Other wage-earners		13–18, 28, 29	14,954
Home industries		19 and 29	5,489
Street sellers, small shops, etc		22–24, 26, 27	11,901
Ill, and no occupation		31	661
Female heads of families, with young persons and children		33–35, 37, 38	13,325
Total			187,048
Female adults, not heads of families, variously employed			16,086
Total of poor			203,134

Table V. BOOTH'S TABLE SHOWING THE FORMATION OF CLASSES E AND F, FROM THE VARIOUS SECTIONS.

		Sections.	Total.
Irregular	Labor.	3	1,349
Regular	Labor.	4 and 5	65,886
Foremen, etc	Labor.	6	17,385
Building and furniture	Artisans.	7 and 8	73,863
Machinery and sundry	Artisans.	9 and 10	67,608
Dress and food	Artisans.	11 and 12	46,731
Other wage-earners		13–18, 28, 29	98,712
Home industries		19 and 20	28,757
Street sellers, small shops, and coffee houses		22–24, 26	32,837
Large shops and licensed houses		25 and 27	6,703
Professional and independent		30 and 32	1,610
Ill, and no occupation		31	225
Female heads of families, etc		33–38	8,416
Total			450,082
Female adults			48,111
Total of E and F			498,193

The advantages of this double classification are evident. It enables one to find out how large a proportion of the persons engaged in any trade are among the very poor, the poor or the well to do, and therefore to infer something of the poverty-inducing conditions that prevail therein. Casual laborers comprise but 4.8 per cent of the whole population, but more than 41 per cent of "the very poor." In our American tables we shall find one of the causes of poverty put down as "no male support." From Mr. Booth's tables we learn that families having female heads include 3.7 per cent of the whole population, but that from these same families come more than 11 per cent of "the very poor," and more than 6 per cent of the poor, and only about 1.6 per cent of classes E to F. (Compare Table VIII.) Of the 71,996 "female adults not heads of families," 67 per cent are in the well to do classes, 22 per cent are considered "poor," and only 11 per cent "very poor." Other useful ways of recomposing Mr. Booth's figures will suggest themselves to those interested.

Turning to the specific question of poverty, Mr. Booth uses a schedule of causes somewhat similar to the German one already given. By the aid of this he tabulates the result of special inquiry regarding 4000 cases of the "poor" and "very poor," known to selected school board visitors in the different districts.

Table VI. BOOTH'S ANALYSIS OF CAUSES OF POVERTY. (CLASSES A AND B.)

		Per ct.		Per ct.	
1. Loafers			60	4	
2. Casual work	697	43	878	55	Questions of employment.
3. Irregular work, low pay	141	9			
4. Small profits	40	3			
5. Drink (husband, or both husband and wife)	152	9	231	14	Questions of habit.
6. Drunken or thriftless wife	79	5			
7. Illness or infirmity	170	10	441	27	Questions of circumstance.
8. Large family	124	8			
9. Illness, or large family combined with irregular work	147	9			
			1,610	100	

Table VII. BOOTH'S ANALYSIS OF CAUSES OF POVERTY. (CLASSES C AND D.)

		Per ct.		Per ct.	
1. Loafers					
2. Low pay (regular earnings)	503	20	1,668	68	Questions of employment.
3. Irregular earnings	1,052	43			
4. Small profits	113	5			
5. Drink (husband, or both husband and wife)	167	7	322	13	Questions of habit.
6. Drunken or thriftless wife	155	6			
7. Illness or infirmity	123	5	476	19	Questions of circumstance.
8. Large family	223	9			
9. Illness or large family combined with irregular work	130	5			
			2,466	100	

"It may be observed," says Mr. Booth, in commenting on these tables, "that the proportion of classes C and D who owe their poverty to questions of employment is greater, while that of those owing it to questions of circumstance is less, than with the very poor; while drink accounts for

about the same proportion in both tables." He further says, for the benefit of those who may think the influence attributed to drink smaller than is probably just, that intemperance is a contributory cause in many cases where it cannot be reckoned the principal one. In the Prussian table already given intemperance was reckoned as the chief cause in only 1.3 per cent of the cases. This low figure may be explained, in part, by the fact that public relief would be withheld as long as was in any wise possible from a family made destitute by intemperance. Other differences in results obtained from the German and English figures may be better understood when we remember that one table is derived from the study of the cases of public paupers, and the others from the study of people who are simply poor, and may or may not receive assistance.

Mr. Booth wrestles manfully with the lack-of-employment problem. "However it is to be explained, the fact remains that neither class B nor class C work much more than half of their time, and that there is no month in the year when this is not so. It is also a fact that most of the work done by class B is inefficiently done, both badly and slowly. It may not be too much to say that, if the whole of class B were swept out of existence, all the work they do could be done, together with their own work, by the men, women, and children of classes C and D; that all they earn and all they spend might be earned and could very easily be spent by the classes above them; that these classes, and especially class C, would be immensely better off, while no class nor any industry would suffer in the least. This view of the subject serves to show who it is that really bear the burden. To the rich the very poor are a sentimental interest; to the poor they are a crushing load. The poverty of the poor is mainly the result of the competition of the very poor. The entire removal of this class out of the daily struggle for existence I believe to be the only solution of the problem of poverty. * * * I do not venture to make any definite

proposal; I only say that it seems time that we should find means to carry voluntarily on our shoulders the burden which otherwise we have to carry involuntarily around our necks."

He further speaks of improving this class off the face of the planet. The conclusion is novel and somewhat startling. To assist nature in the elimination of the unfit is a large undertaking. If this class is to be lifted bodily out of the industrial arena, what assurance have we that others will not promptly degenerate to take their places? To crowd all who drop into this class mercilessly out of existence is not possible in the present state of public opinion. If, however, the key to the whole situation lies in the word "improve," we have a very sound conclusion, but a very old one. But, whatever may be the solution of the problem, the terms of the problem itself stand out with new and helpful distinctness in consequence of Mr. Booth's ingenious and faithful work.

Turning now to American work in the same field, I would give first a small table from the report of Mr. Charles D. Kellogg to the National Conference of Charities and Corrections, Omaha, 1887. He was chairman of the Committee on Charity Organization, and his figures were gleaned from the reports of about forty Charity Organization Societies in our leading cities.

CASES OF APPLICANTS FOR RELIEF.	DECISIONS BY AMERICAN C. O. S., 1887.
Worthy of continuous relief	2,888, or 10.3 per cent.
Worthy of temporary relief	7,451, " 26.6 " "
Need work rather than relief	11,280, " 40.4 " "
Unworthy of relief	6,342, " 22.7 " "
	27,961, 100.0 " "

On this table Mr. Kellogg comments as follows: "For several years past there has been a very close correspondence of published experience between Boston and New York, and in these cities the percentage of those needing work rather than relief has been 53.4, and of the unworthy, 15.8. While they

found that employment was the proper relief for fifty-three in every hundred of their cases, the general experience has formed that opinion in only forty of one hundred cases; and while they have adjudged sixteen in one hundred to deserve police discipline, the aggregate of all reporting societies represents about twenty-three as requiring such treatment. On the other hand, there is a notable unity of opinion that only from thirty-one to thirty-seven per cent, or say one third of the cases actually treated, were in need of that material assistance for which no offices of friendly counsel or restraint could compensate. The logical application of this generalization to the whole country is that two thirds of its real or simulated destitution could be wiped out by a more perfect adjustment of the supply and demand for labor, and a more vigorous and enlightened police administration.

"Subsequent and wider experience may modify this conclusion, but hardly can wholly overturn it; and, while it stands, it is of the highest significance in the solution of the poor problem. It throws a flood of light upon the question, showing how far destitution is criminal, how far it is misfortune that may be made transient, and how far it is a permanent and genuine claim upon our humanity. To know this is to know the general lines to which our remedial efforts should be shaped."

At the Fifteenth Annual Conference of Charities and Corrections, held in Buffalo, the Charity Organization section debated carefully and adopted a large classificatory schedule to be used in future by all the societies. As very full records of each case are kept by these societies, and as a very large share of the pauperism of the country is now reviewed by them, the statistical results ought to be of value.

The new classification groups the facts considered to be of statistical importance under seven general heads: —

1. The decisions of the local society regarding the cases of applicants for relief are classified as follows: Should have continuous relief, should have temporary relief, needing work

rather than relief, should have in-door relief, undeserving, not requiring relief. These divisions are intended to be mutually exclusive. The uses to which the facts may be put, when obtained, are indicated by the extract already given from Mr. Kellogg's report.

2. The marital state of the cases will be exhibited under the heads, married couples, widows, deserted wives, single women, deserted husbands and widowers, single men.

3. The chief causes of need are next tabulated under the ten headings, accident, imprisonment of bread-winner, insanity, lack of employment, insufficient earnings, no male support, physical defects, sickness, intemperance, shiftlessness or inefficiency. It will be noticed that this list of causes varies somewhat from those previously given. Those engaged in the practical work in our large cities believe that the totals that will accumulate under the title of "imprisonment of bread-winner" will indicate needed reforms in our punitive machinery, especially as regards misdemeanants. The direct burden upon the community of the care of the insane is very large, and it will be interesting to find how large is the collateral burden also entailed. Preliminary investigations indicate that the number of "deserted wives" among the dependents will furnish new ground for anxiety regarding our chaotic marriage and divorce laws.*

The other facts provided for in the schedule are: number of bread-winners in a family, number and ages of persons in families investigated, number of rooms occupied, nativity of the heads of families, and education (ability to read and write).

*At Buffalo the writer tried to have a system of enumeration of the causes of poverty adopted that would indicate not only the chief but the subsidiary causes as well. The plan was to let ten units stand for the influences producing destitution in each case; these could then be divided between the several contributory causes, in accordance with the facts. For instance, all ten counts might be chargeable to one cause, as accident; or sickness, 5; intemperance, 3; and lack of employment, 2, might be the decision where the father was sick, partly in consequence of bad habits, and children old enough to work could not find employment. Subsequent experience with the agents of the Charity Organization Society of Baltimore has confirmed the author's opinion that this more extended analysis is practicable and useful. The groupings of subsidiary causes are especially interesting. One cause should be given prominence in each case.

When I first agreed to prepare this paper, I expected to be able to use illustrative tables, prepared according to this schedule by the Societies in Baltimore, New York, and Boston. This is not practicable, as it takes some time to acquire facility and consistency in using a new classification of the kind. The figures now accumulated will be much modified, and it seems inadvisable to publish hastily-compiled tables. The schedule adopted was, however, based upon one devised by the Buffalo Charity Organization Society, and I subjoin two tables from the Tenth Annual Report of this Society.

Table VIII. CAUSES OF POVERTY.

(From Tenth Annual Report of the C. O. S. of Buffalo, N. Y.)

	1878–79	1880	1881	1882	1883	1884	1885	1886	1887	Total.	Per cent of cases.
Lack of employment	162	62	72	235	186	316	550	169	121	1,873	30.2
Sickness	116	73	145	156	181	162	172	120	143	1,268	20.5
Accident	20	14	17	17	32	26	51	14	17	208	3.4
Insanity of bread-winner	3	6	5	3	5	3	14	8	4	51	.8
Insufficient earnings	97	48	86	74	32	22	35	33	24	451	7.3
No male support	33	26	44	37	25	21	15	65	131	397	6.4
Imprisonment of bread-winner	8	11	15	15	7	14	6	14	18	108	1.7
Intemperance	127	81	81	101	72	69	44	84	41	700	11.3
Shiftlessness	83	40	74	69	64	37	18	50	5	440	7.1
Physical defects	78	41	121	76	44	38	55	45	27	525	8.4
No cause*	36	17	17	21	28	13	12	32	0	176	2.9
Total number of cases	763	419	677	804	676	721	972	634	531	6,197	100.0

* Cause undetermined.

Table IX. MARITAL STATE OF CASES TREATED.

(From the Tenth Annual Report of the C. O. S. of Buffalo, N. Y.)

	1878–79	1880	1881	1882	1883	1884	1885	1886	1887	Totals.
Married	361	204	307	467	420	497	726	396	321	3,699
Widows	262	149	236	181	146	123	129	143	128	1,497
Deserted wives	67	55	100	111	71	67	71	77	58	677
Single women	29	4	11	16	11	7	9	9	12	108
Deserted husbands, and widowers	21	5	16	21	21	20	23	8	6	141
Single men	23	2	7	8	7	7	14	1	6	75
Total number of cases	763	419	677	804	676	721	972	634	531	6,197

Each of these 6197 cases was reviewed in detail by Mr. N. S. Rosenau, General Secretary of the Buffalo Society. From conversation with him I infer that some would have found intemperance the chief cause in a larger number of cases, but that, in the main, few exceptions can be taken to his work. In the second table the large number of deserted wives, 667, should be noticed.

Two studies along entirely different lines than the foregoing are those of Mr. McCulloch and Mr. Dugdale. The former was presented at the Buffalo Conference of Charities and Corrections, where a very remarkable genealogical table of pauper stock was exhibited to illustrate it. This table was of a character not easily reproduced in type, and the most pertinent facts are here only briefly summarized.

Mr. McCulloch named his paper "The Tribe of Ishmael, a Study in Social Degradation." It is concerned with a "ganglion of pauper families" in and about Indianapolis, Ind. Their history, so far as obtained, fills 7000 pages of the records of the Charity Organization Society of Indianapolis. The account of the "tribe" began about 1840, and the number of individuals concerning whom specific information has been obtained is 1692. The families composing the group live by petty stealing, begging, ash-gathering, and "gypsying." In the early days there was a slight infusion of Indian blood. They are usually licentious, 121 of them being prostitutes; but, as a rule, they are not intemperate. The records of the city hospital show that, taking out surgical cases, acute general diseases, and cases outside the city, seventy-five per cent of the cases treated are from this class. Mr. McCulloch also estimates that since 1840 fully three fourths of the public out-door relief, ranging from $7000 to $22,000 per year, has gone to the families belonging to this inter-related group. The moral that Mr. McCulloch draws is that public out-door relief, as administered by American political officials, "sends the pauper out with the benediction 'be fruitful and multiply;'" and "that private indis-

criminate giving joins public relief in producing still-born children, raising prostitutes, and educating criminals." This, it will be seen, bears upon the last cause given in the analysis with which this paper began, viz., Unwise philanthropy.

Richard L. Dugdale's study of the "Juke" family is quite generally known, and, having been recently republished (1888) by the Putnams, its many and valuable statistical and genealogical tables are easily accessible to all. Mr. Dugdale estimates that 1200 of this family in 75 years cost the community directly and indirectly not less than a million and a quarter dollars. The table of pauperism in this family is given herewith. (Table X.) "Men and women of Juke blood" are those descended from the father of "Margaret, the mother of criminals." "Men and women of × blood" are those who married into this family.

Speaking in general of the habits of these people, Dugdale says: "*Fornication*, either consanguineous or not, is the backbone of their habits, flanked on the one side by *pauperism* and on the other by crime. The secondary features are *prostitution*, with its complement of *bastardy*, and its resultant neglected and miseducated childhood; *exhaustion*, with its complement *intemperance*, and its resultant unbalanced minds; and *disease*, with its complement *extinction*." From the "Tentative inductions on pauperism" the following are of especial importance: —

"1. Pauperism is an indication of weakness of some kind, either youth, disease, old age, injury, or, for women, childbirth.

"2. Hereditary pauperism rests chiefly upon disease in some form, tends to terminate in extinction, and may be called the sociological aspect of physical degeneration.

"3. The debility and diseases which enter most largely into its production are the result of sexual licentiousness."

As regards the influence of drinking he says: "Some of the especial points that need observation in the study of intemperance seem to be, when was drinking begun? when

Table X. TABLE OF PAUPERISM SHOWING OUTDOOR* AND ALMSHOUSE RELIEF.

(From "The Jukes," p. 29.)

	Number of persons receiving out-door relief.	Number of years.	Estimated cost at $15 per year.	Number of persons receiving almshouse relief.	Number of years.	Estimated cost at $100 per year.	Total number of persons.	Percentage receiving out-door relief.	Percentage receiving almshouse relief.	Percentage of almshouse pauperism, male, female, and total, for New York State, in 1871.	Ratio between pauperism of State at large and the Juke family.
Women of the Juke blood	45	242	$3,630	24	35	$3,500	251	13.94	9.56	1.26	As 1 to 7.500
Men of the Juke blood	50	270	4,050	29	46	4,600	224	20.09	12.94	1.39	As 1 to 9.309
Women of the X blood	20	125	1,875	5	7	700	67	29.85	7.44	1.26	As 1 to 5.900
Men of the X blood	27	97	1,455	6	8	800	102	26.56	5.88	1.39	As 1 to 4.229
Total No. of Juke blood	95	512	$7,680	53	81	$8,100	475	17.59	9.80	1.33	As 1 to 7.368
Total No. of X blood	47	222	3,330	11	15	1,500	169	27.81	6.51	1.33	As 1 to 4.893
Grand total	142	734	$11,010	64	96	$9,600	644	20.02	9.02	1.33	As 1 to 6.767

*The out-door relief is dispensed by eight poor-masters, who live in four different towns, each town keeping a separate record of names and amounts of help. These records, since the beginning of this century, amount to an aggregate of 225 years, of which only sixty-four years could be consulted, the records of the nineteen missing years being in many cases destroyed.

This table exhibits only the amount of relief which this family has obtained, as shown by the records.

was habitual intemperance fixed? what were the sexual habits at various periods, especially in youth? whether any deep-seated disease has preceded or followed the intemperate habits; what kind, and whether causing it or not; whether excessive study or labor has exhausted the vitality; whether there is a hereditary predisposition; whether the trade or

occupation is detrimental to health; whether the locality of the habitation produces disease, and what kind; what is the temperament of the man?" On page 89 he gives a table of the habits of thirty criminals, who were all habitual drunkards, and also given to prostitution. He shows here that the latter vice is acquired at an earlier age than the former, and that venereal disease is usually contracted before the drink habit becomes habitual. It must always be remembered that he is investigating the scions of corrupt stocks, persons in the last stages of physical, mental, and moral degeneration, and that the sequence of vices may not be the same among other classes.

Dugdale's "Tentative generalizations on heredity and environment" conclude as follows: "The logical induction seems to be that environment is the ultimate controlling factor in determining careers, placing heredity itself as an organized result of invariable environment."

We have thus worked our way back to the conclusion at first reached, that the study of individuals leads us to dwell upon character as a factor in causing poverty, but that if we search far enough we find that the primary cause is environment. In investigating the causes of poverty classed as "objective" nearly all the social and some of the natural sciences must be required to furnish conclusions, and statistics, as the bond servant of them all, will have its share of work.

Upon the submission of Dr. Warner's paper, Rev. S. W. Dike, after a few general remarks upon the Statistics of Divorce, made some suggestions on statistics relating to the causes of crime and vice, and their interpretation. He spoke substantially as follows: —

I have been able only to take a hasty glance through the paper of Prof. Warner since coming into this room today. But that was enough to show that we are both moving in the same direction, and by similar methods. I have long felt that something should be done by statisticians on this matter, and it is evident that public opinion

will soon demand an effort to meet the want. The various and changing views upon the chief causes of crime afford a good illustration of the existence of the need. Let me give some of these, all taken from most reputable sources. Some of the friends of temperance say that four fifths of all the cases of crime are due to intemperance. The Brewers' Association, I believe, attempts to put nine tenths to other causes than intemperance. An eminent authority has repeatedly said that, so far as the volume of crime and of criminal conditions is concerned, licentiousness is the most potent factor in existence. Only last Sunday Mr. Robert Treat Paine, according to the reports of his address, put down bad homes as the chief cause of crime in this city, and gave intemperance the second place. I questioned separately several of the best experts in criminal studies last summer at the meeting of the Prison Association, and every one replied, — Bad homes and heredity. The superintendent of one reformatory finds the lack of a good trade a leading cause of crime; while another says a weak will is oftener found in a criminal than a resolute will.

Let us turn to some figures in the report of the Massachusetts Bureau of Labor Statistics for 1881. I do this because of uses that have been made of these figures, for which, it should be said, Col. Wright was in no just way responsible. For he was charged with the duty of finding how far intemperance alone entered into crime. I do not say *causes* of crime, but crimes themselves,— and he performed this exact task. A year or two after this report was published I called his attention to the improper deductions that were being drawn from it by perfectly sincere but undiscerning persons, and he put a caution against this error into a later report. Let us look at these statistics of crime in Suffolk county a moment. Out of a total of 16,897 sentences, 12,289, or 72 per cent, were directly for so-called rum offences, including drunkenness, liquor-selling, etc. Of the remaining 4608, all of which were carefully studied by experts, it was found that 43 per cent, or 12 per cent of the grand total, were more or less directly due to liquor. Adding this 12 per cent to the 72 we have 84 per cent in all. Now, if we say that this represents the *share* of these offences in the whole, under the laws, *as they are made and enforced*, it is perfectly correct to speak of 84 per cent as representing it. But when we carry over the figures to *causes*, and say rum is the *cause* of 84 per cent of the crimes, we go too far.

This kind of reasoning makes a thing the cause of itself. Under it licentiousness becomes the "cause" of less than 2 per cent of all crime.

I find some other things in this investigation worthy of notice here. The habits as to drinking of the criminals in these 4608 cases were carefully ascertained, and of them 1158, or 25 per cent, proved to be total abstainers. Is total abstinence the "cause" of one fourth of all the crimes which are not distinctly rum offences? Not unless this per cent exceeds the per cent of total abstainers among the population of the ages and sexes from which the criminals come. Turn aside a moment to note some further figures that throw light upon the popular impression as to the connection of drinking with licentiousness and other kinds of crime, so far as this report covers the subject. Of all the convictions for the various licentious offences over 37 per cent were of persons who were total abstainers. Of the night-walkers 39 per cent were total abstainers, and 42 per cent of those sentenced for fornication. For larceny, 29 per cent; for breaking and entering, 37; for forgery, 70; for gambling, 69; and for violation of Sunday laws, 58 per cent were total abstainers. So much, incidentally, on this single point of the relation of intemperance to other crimes.

Let me now call attention to some considerations relating to the method of the statistical determination of the *causes* of crime and vice.

The basis chosen needs attention. In the study of crime this may be either (*a*) sentences or convictions, (*b*) arrests or (*c*) actual crimes or the criminals committing them. The latter would be the ideal basis, but it is of course impracticable in actual statistics. If the first is taken, then some correction must be applied to results for the inequalities between the various crimes in respect of detection and conviction, since the laws are much better enforced in some directions than in others. This is necessary if we would determine the social effect of crime statistically. And if we would measure the social effect of the vices underlying the crimes by the statistics of crime, still another correction needs to be made. For the amount of vice back of crime in one class may be greater than in another, both in absolute amount and in the part of it that is made criminal by law. For example, drinking may be a vice in a large number of instances where it does not become drunkenness and thus a crime, while a far greater proportion of the acts of sexual vice are held criminal by

law. These are points that must be met if our statistics are to be expected to have much value in guiding action upon social problems.

But, secondly, consider suggestions as to causes of crime. The great thing to be considered, as seen from the paper of Prof. Warner, is the need of recognizing the existence and providing for the measurement of the several contributory causes to the same crime, wherever more than one exists. Criminal acts, like all others, are often very complex in their causes and relations, and they must be studied accordingly. Each of the leading theories as to the cause of crime may have much truth in it; and when their several lines are properly worked out their apparent conflict will disappear.

For this purpose three or four tables may be made. Perhaps the simplest would be a table formed by putting at the left the various classes of crime, and at the top the several causes, like intemperance, licentiousness, bad homes, idleness, and so on. Then, after the method Mr. Wright successfully used in the single matter of intemperance, by taking up each separately, find into what per cent of the cases each cause entered in any considerable degree. Then reduce the footings of these columns to the basis necessary to comparison on a scale of one hundred parts to include all. I have thought of another step, which you will see Prof. Warner mentions in a note. It is that the causes of each crime be assumed to be possibly ten in number or quantity, and some attempt be made to distribute them accordingly. For example, if a crime is clearly due to a single cause, put ten in that column and zero in the others. But if due to several causes, distribute the ten accordingly. A cursory examination of Prof. Warner's paper shows an astonishing change from our American notions about intemperance as a cause of crime. If I remember the figures, in one of his tables intemperance is charged with only 14 per cent of all crime; in another with only 11, and in another with less than 3 per cent. Probably these higher methods have been used to obtain these results, and possibly incorrectly. But we must all banish from our minds every unstatistical motive in this study, if we would do the best work.

We may, however, go still farther. In the ordinary statistics every crime, whatever it is, is made to count one, no more and no less. The sentence of a boy for truancy or trespass on your lawn, or one of the large number of cases of assault and battery, counts as much in the ordinary tables as a homicide. This is like putting all your coins into

piles of copper, silver, and gold, and then getting their value by counting the number in each, regardless of size or quality. Some dynamic measure seems necessary in any true estimate of crime. I recur to the two leading vices, for illustration of this. Drunkenness is largely purely individual, involving directly but a single person. But licentiousness is dual, involving two persons of opposite sex. It is organic, and vitiates the physical basis of the family. On the other hand, drunkenness and rum-selling have their peculiar bearings. Now, corrections should be applied to the columns that represent the numbers of the several crimes, until all differences of value in the units are eliminated or reduced to a common statistical basis, as far as possible, after the method by which the gross wages of several states or countries are corrected for length of day's work, productiveness, cost of living, etc., in any fair comparative study of wages.

The proximate and remote causes, also, of crime might well be classified and valued. The moral or personal elements, like a weak or untrained will and illiteracy, the domestic conditions, and others, would properly come into the scope of this general method.

I have made no attempt here to do more than make crudely wrought out suggestions, which are neither scientifically complete nor all within the reach of the practical statistician. My great object is to invite the attention of statisticians more competent than myself to grapple with the scientific and practical difficulties of the problem. But I think there can be no question of the need of some such treatment nor of the vast practical value of the results of a reasonable approach to a successful solution of the problem to all concerned in the social welfare. I think our admirable State Bureau of Statistics may well take up the subject. I am sure we are all grateful to Prof. Warner for the illustrations he has given us in this direction.

STATISTICS OF DIVORCE IN THE UNITED STATES AND EUROPE.

The Hon. Carroll D. Wright, Commissioner of Labor, transmitted to Congress, February 20th, a report "On the Statistics of and Laws relating to Marriage and Divorce in the United States," for the twenty years 1867–1886 inclusive. The report will be published during the coming summer in a volume of nearly one thousand pages. An appendix is added, covering the same ground, for Europe and Canada, though in less detail and completeness. It was found, as it was expected, that many of the deeper yet more important sociological facts lay beyond the reach of the investigation. Some of them are probably unattainable by any statistical inquiry. But others may be brought within the scope of subsequent investigation should public interest justify making the necessary outlay. The points taken up were selected only after the most careful scrutiny and study of the possibilities of the subject. The ground covered is stated in the advance sheets which Mr. Wright has given to the press. The report begins in two chapters, giving a complete and accurate analysis of the laws of marriage and divorce, including, of course, the changes made in them, and their effect as seen in the statistical tables.

The third chapter contains the fundamental table showing the movement of marriage and divorce from 1867 to 1886, by states or territories and by counties. The divorces are reported for 96 per cent of all the 2700 counties in the country, including 98 per cent of the entire population. The records of marriage are so badly kept that statistics can be given for only 66 per cent of the counties. The loss of records by fire makes returns from some counties incomplete. The Appendix, relating to Canada and Europe, is necessarily

less full than the body of the work on our own country. But it includes, on the chief points, much more than can be found in all the European official and other publications, a great deal of the material having been gathered for the first time, for this report, from the original sources by the agent of the Department.

Chapter IV deals with the causes of divorce with numbers under each cause, as they appear in the records of the courts. Chapter V treats of the duration of marriage before divorce takes place. Chapter VI compares, so far as the facts could be had, the place of residence at time of marriage, with the place where the divorce was granted. This shows the number of divorces in a given state from the marriages that took place within the state and from those that took place in the other states and counties. The reverse facts are also as given, by which it can be seen where those who were married in any given state have obtained their divorces. The bearing of this upon that part of the problem of uniform laws which spring from migration from state to state, for the purpose of divorce under easier conditions, is apparent. Another chapter will give the number of children of the divorced parties, and also the proportion of cases, in a few representative counties, in which alimony was granted. Chapter VIII is made up largely of general tables, bringing these results into more compact form.

Some of the leading statistical results are here given from the advance sheets. These figures may be changed under the final revision, but the Commissioner expects only slight variation from them. The following table gives the whole number of divorces in the entire United States for each of the twenty years: —

DIVORCES IN THE UNITED STATES BY YEARS.

Year.	Divorces.	Year.	Divorces.	Year.	Divorces.	Year.	Divorces.
1867	9,937	1872	12,390	1877	15,687	1882	22,112
1868	10,150	1873	13,156	1878	16,089	1883	23,198
1869	10,939	1874	13,989	1879	17,083	1884	22,904
1870	10,962	1875	14,212	1880	19,663	1885	23,472
1871	11,586	1876	14,800	1881	20,762	1886	25,535
Totals....	53,574	.....	68,547	.....	89,284	.....	117,311

There were 328,716 in the twenty years, and 156.9 per cent more divorces in 1886 than in 1867. The population of the country, in this time, increased about 60 per cent.

Taking the divorces by quinquennial periods, they were as follows: —

Period.	Divorces.	Increase per cent.
1867-1871	53,574	
1872-1876	68,547	27.9
1877-1881	89,284	30.2
1882-1886	117,311	31.3

The fourth quinquennial period had 118.9 per cent more divorces than the first. The increase is seen to be twice as great, or more than twice as great as the population.

The only states or territories where this increase, as determined by quinquennial periods, has not taken place, are Maine, Vermont, and Connecticut, in the East, under the restrictive legislation brought about by the National Divorce Reform League and its friends; South Carolina, which never granted divorce except for a short time during the period of reconstruction after the war; and Nevada and Utah in the West. The decline of population accounts for the apparent decrease in Nevada. Utah shared in the general movement until 1876 and 1877, when divorces suddenly reached the enormous number of 709 and 914 respectively. The next year they fell to 298, and were only 119 in 1886. The excessively high numbers were due to the use made by Eastern parties of a loose statute, which was repealed after a

year or two. In Michigan, it may be added, there has probably been a decrease of divorces since 1887, due to the restrictive legislation of that year.

On dividing the country into three great sections, significant results appear. These sections are, first, the fourteen northern states east of the Mississippi River, which contained, in 1880, about 51 per cent of the population of the entire United States; secondly, the ten old slave states, including the District of Columbia; and, thirdly, the remaining and mostly new states and territories west of the Mississippi. Adopting this division, we have the following results by quinquennial periods: —

Section.	1867-1871.	1872-1876.	1877-1881.	1882-1886.	Totals.
Northern.....	36,809	42,144	50,125	60,478	189,556
Southern.....	10,042	15,087	22,881	32,952	80,962
Western.....	6,723	11,316	16,278	23,881	58,198
Totals.....	53,574	68,547	89,284	117,311	328,716

The fourteen northern states, with 51 per cent of the population of the country in 1880, granted 36,809, or 68.7 per cent of all the divorces in the first five years, and 51.6 per cent of the divorces in the last five years. Between 1870 and 1880 the population of this section increased about 20 per cent while the divorces of the last five years were 64 per cent more than those of the first five. But in the ten old slave states the divorces were 228 per cent more in the last five years than in the first five, while the population of 1880 was 33 per cent more than that of 1870. In the rest of the country beyond the Mississippi the increase of divorces in the fourth over the first quinquennial period was 255 per cent. But the population increased 84 per cent in the census decade, and probably much more accordingly in the twenty years. This study shows that, while at present the largest number of divorces, and the highest divorce rates, are found in the North and West, the most rapid increase in proportion to

the population is now going on in the South. Delaware is an exception to the marked increase. But other states are remarkable. Taking a few by the five-year periods, this is very striking. Alabama granted 479 in the first five years, and 2471 in the last five. Arkansas goes from 562 to 2686; Florida from 198 to 965; Georgia from 587 to 1454; Kentucky begins with the large number of 1726, and reaches, in the last five years, 3435; Louisiana increases from 173 to 759, and Mississippi from 373 to 2303. Missouri goes from 2281 to 5704; North Carolina from 130 to 578. Tennessee, like Kentucky, begins with a large number, 1415, and doubles it, granting 3418 the last five years. Texas, with a rapid growth in population, increases divorces from 699 to 5888. The Virginias move almost exactly together. Old Virginia goes from 382 to 1050, and West Virginia, though having less than half the population, from 376 to 1015.

Among the older states of the North and West the same steady increase goes on, while the volume is as yet larger than in the South. We still take quinquennial periods. Illinois increases from 5803 to 12,051; Indiana from 5741 to 7840; Michigan from 2635 to 6523; New Hampshire from 781 to 1633; New Jersey from 390 to 1072; Ohio from 4729 to 8934. New York does not increase much beyond her population. In the first five years she granted 3755, and in the last, 4759. Pennsylvania rises from 3158 to 5420.

One of the advance sheets shows the estimated number of existing married couples in the several states and territories to each divorce, for the years 1870 and 1880, when the census furnishes a close comparison with population. The estimated married couples increased from 7,281,031, in 1870, to 9,428,885, in 1880, or 29.5 per cent. The divorces in 1870 were 10,962, and in 1880 they were 19,663, or an increase of 79.4 per cent. The following table shows the order in which the states and territories stood on this basis in 1880, beginning with the worst. It should be remembered that Maine, in 1883, was taken out of the place here given to it, and

probably slight changes would be made in the order if the year 1886 could be taken for the comparison.

States and Territories.	Married Couples to one Divorce.	States and Territories.	Married Couples to one Divorce.	States and Territories.	Married Couples to one Divorce.
Colorado	136	Arizona	307	Massachusetts	566
Nevada	170	Arkansas	326	Minnesota	647
Wyoming	173	Dakota	328	Alabama	795
Oregon	175	Connecticut	340	Pennsylvania	851
Montana	180	Florida	341	West Virginia	974
New Hampshire	186	Texas	382	New York	1,151
Rhode Island	190	Ohio	389	Georgia	1,152
Washington	202	Tennessee	425	Maryland	1,380
Maine	204	Kansas	428	New Jersey	1,563
Utah	219	Nebraska	431	Louisiana	1,629
California	230	Missouri	440	Virginia	1,743
Idaho	248	Vermont	455	New Mexico	2,615
Indiana	262	Wisconsin	464	North Carolina	3,149
Michigan	269	Mississippi	498	Delaware	5,541
Illinois	271	District of Columbia	508	South Carolina	—
Iowa	306	Kentucky	549		

For purpose of comparison of city and country, 29 counties containing important cities were selected. Probably some other cities have higher rates than some of these. But the following table gives the figures for these 27 cities in the order of the magnitude of their ratios: —

County containing the City of	Married Couples to One Divorce in the County.	Married Couples to One Divorce in the rest of the State.	County containing the City of	Married Couples to One Divorce in the County.	Married Couples to One Divorce in the rest of the State.
Indianapolis	128	278	Dist. of Columbia	508	508
Providence	180	220	Savannah	531	1193
San Francisco	182	270	Baltimore	640	3796
Chicago	183	308	Atlanta	663	1180
Portland, Me.	185	207	Omaha	711	416
Nashville	216	452	Pittsburg and Allegheny City	764	860
Cleveland	221	409	Philadelphia	825	857
Memphis	243	446	Richmond	868	1850
Milwaukee	251	516	Newark, N. J.	907	1796
St. Louis	274	408	New York	1004	1207
New Haven	292	359	Brooklyn	1020	1172
Detroit	296	266	New Orleans	1074	1926
Louisville	363	580	Jersey City	1145	1714
Boston	469	600			

In the above table only two cities, Detroit and Omaha, have a lower divorce rate than the rest of the state to which they belong. But several others closely approach the general average of their states, and in many of the states from one to a dozen rural counties can be found having generally higher divorce rates than those containing the large cities.

The tables showing the numbers of those divorced who were married in the state and out of it are not yet accessible to the student. I have seen those for some of the states, and these show that from 60 to 90 per cent of all the divorces granted were to parties whose marriage had taken place in the very state where the divorce occurred. And this is true, notwithstanding the shifting movements of population. California approximates the lower figure and Alabama reaches or passes the higher. A prediction as to the exact percentage of the total would be at present unsafe. But anyone who will study the advance sheets and see how widely and comparatively uniformly the movement is distributed will come to the conclusion that the migration from state to state for divorce under easier conditions, while it may be very considerable in the aggregate number of instances, must really constitute a small percentage of the great total. Of course, the data for a statistical opinion on this point are imperfect, as some elements of the problem were lacking. But the facts in those states where the place of marriage could be pretty largely ascertained are positive as far as they go.

As the other material of the report is still beyond reach, we take up the tables for Europe. As much less was made of this, and the Department did its work under the difficulties peculiar to the conditions of this part of the task, the returns are necessarily less complete than those of the United States. Still, most of the existing European material on this subject has been brought within the reach of students, and much added that has not yet appeared in any European publication. The briefest summary is given below. It was first printed,

as were some of the preceding tables, in the annual report of the National Divorce Reform League. The rate of the movement in Europe closely parallels that in the United States. But the volume of it in proportion to population is vastly greater here than in Europe, though Switzerland, Denmark, and some parts of Germany, have rates about as high as the average of American States.

The eleven European countries, and Canada, which gave statistics for both years, had 3541 divorces in 1867, and 9200 in 1886. Between 1876 and 1886, the thirteen countries reporting then, increased their divorces from 6540 to 10,909, or 67 per cent. In the same period the increase in the United States was 72.5 per cent. In all the European countries reporting in 1885 there were 23,735 divorces. Probably those granted in all Europe in 1886 would exceed but little those of the United States for the same year. The exceptions to the general rate of increase in Europe are, as in the United States, very few. Some of the statistics between 1867 and 1886 are as follows: Canada granted no divorces in 1867, but had 4 in 1868, and 12 in 1885; England granted 130 in 1867 and 372 in 1886; Scotland increased in the twenty years from 32 to 96; Baden from 19 to 143; Bavaria declined from 270 to 238; Hesse increased from 28 to 53; Saxony from 396 to 917; Wurtemburg from 94 to 161; the Netherlands from 133 to 418; Sweden from 128 to 226; and Norway from 33 in 1870 to 54 in 1884; other countries for other years are Alsace-Lorraine from 56 in 1874 to 117 in 1886; the city of Hamburg from 145 in 1880 to 287 in 1886; Prussia from 2329 in 1881 to 3808 in 1886; Roumania from 276 in 1881 to 432 in 1880; the German Empire entire from 5263 in 1882 to 6078 in 1886; Denmark from 479 in 1871 to 577 in 1881; and Russia from 892 in 1867 to 1196 in 1885; Austria and Hungary increased their divorces very little for the five and ten years reported. Italy decreased from 728 in 1869 to 556 in 1885. But France, under the old law, granted 2181 separations in 1867, and

3010 in 1883. Since the law of July, 1884, which re-established divorce in France, the figures are as follows: In 1884 there were 4478 divorces; in 1885 there were 6161, and in the next year, 6078. Other tables for France, Belgium, and Sweden run back from 50 to 75 years, and show a pretty steady increase during the period previous to 1867, where this report takes up the subject.

SAMUEL W. DIKE.

Auburndale, Mass.

LOSSES IN THE CIVIL WAR.

Regimental Losses in the American Civil War, 1861–65. By Wm. F. Fox, Lt.-Col. U. S. V., Prest. of the Society of the Twelfth Army Corps. Albany Publishing Company.

In this large quarto volume of 595 pages Col. Fox has made one of the most important contributions to military statistics embraced in the literature of war. The present publication deals chiefly with the losses among the national forces in the great struggle of 1861–65.

Merely to have compiled from the official records of the United States War Department the numerous and extensive tables which are comprised in the volume before us would have been a work of vast magnitude, deserving the fullest recognition from the statistician and the military historian; but Col. Fox has done far more than this. He has, with almost incredible labor, supplemented the records of the War Department by material drawn from the records of the several States, with the result of presenting, for the first time, the full story of the terrible losses sustained by the Union armies in a contest lasting through four years, yet carried on with a vehemence and ferocity scarcely known to the history of war.

The reader will better understand why it is that the records of the War Department require to be thus supplemented if we quote the following explanation in Col. Fox's words: —

"In each regiment there are men borne on the muster-out rolls as 'missing in action,' whose fate had not been determined at the close of the war, at which time these rolls were made out. Since then many of the States have made strenuous efforts to ascertain the fate of these men. But the War Department declines, and very properly, to account for missing men as killed until official information is received to that effect. The official channels, through which such information must come, are the original records of the muster-out rolls,—the 'final statements,' as they are technically called,—and the affidavits which may accompany a pension claim.

"Now, if these missing men have no heirs to prosecute their claims at the Pension Office, the records at Washington will remain unchanged, and the men will still be recorded there, not among the 'killed,' but as 'missing.' The Mortuary Statistics in these pages are compiled largely from State records, hence the figures, in many cases, will exceed those of the War Office."

No statistician can fail to appreciate the value of such revision and correction of the official lists at Washington, made, as these were, at the close of the war, when regiments were hastily mustered out of service, and before the records of Confederate hospitals and prisons were available to be used in accounting for the long rolls of the "missing in action."

The largest single piece of work in this volume consists (chapter x, pp. 122–423) of an account of "Three Hundred Fighting Regiments," giving the battles in which each regiment on the list was engaged, and its loss therein, together with the total number of deaths from first to last, whether from wounds or from disease. Long as this story is, it is made intensely interesting by the incidents which this author has freely interspersed.

Chapter XI (pp. 424–464) presents for each important battle of the war the regiments, it may be one; it may be three, or four, or ten; it may be thirty-seven, as at Gettysburg, or forty-five, as in the Wilderness, which there suffered very heavy losses in killed, wounded, and missing. Chapter XIV (pp. 540–551) gives the total losses in each considerable engagement, in both the Union and the Confederate forces engaged.

Perhaps the most valuable chapter of all is the twelfth (pp. 465–524), which enumerates every regiment and battery in the Union armies, with the total number of deaths in each, whether by wounds or by disease, with distinction of officers and enlisted men. Chapter XIII (pp. 525–539) presents corresponding results by State totals, in

comparison with the number of troops enrolled and the total population of military age; and also lists of losses in the United States navy during the war. Chapter XV is devoted to a more general statement of the losses in the Confederate armies.

We have, thus far, spoken only of the later and longer chapters of this volume. The ten earlier and briefer chapters are those to which the attention of the general reader will chiefly be given. They contain a wealth of summarized statements regarding the casualties of the service, grouped in the clearest manner, and accompanied by much interesting matter of a descriptive or explanatory nature. We have here the proportions existing between the killed and the wounded in the battles of the war; between those instantly killed and those subsequently dying of wounds; between commissioned officers and enlisted men wounded in action or dying of disease. We have anthropometric statistics, dealing with the height, the weight, complexion, etc., of recruits. We have lists of the regiments suffering the largest number of casualties in single actions, and of those suffering the largest number of casualties in their term of service. We have comparisons, as to the losses incurred, between the greatest of our battles and the most famous battles of European warfare. We have also an excellent brief account of each army corps organized during the war, with sketches of certain celebrated divisions and brigades. We have not a little of the pathos and of the grim humor of war, with here and there a touch of its fun.

FRANCIS A. WALKER.

SMITH'S STATISTICS AND ECONOMICS.

Statistics and Economics, an Outline of Statistical Science, with Especial Reference to the Use of Statistics in Political Economy and Social Science. By Richmond Mayo Smith, A.M., Professor of Political Economy and Social Science in Columbia University. Pp. 127. Published by the American Economic Association. Baltimore. Sept.-Nov., 1888.

Mr. Carroll D. Wright relates of Dr. Engel, Director of the Prussian Statistical Bureau, that, in a recent conversation, he expressed himself to the effect that he would gladly exchange his special training in statistics for the opportunity offered in the United States for statistical investigation. This certainly seems a little strange when first stated, but when explained appears to be quite reasonable. In Europe the statistician is constantly cramped by his government. There are some lines of investigation that he cannot enter upon. In this country, on the other hand, the popular demand for statistical information is constantly forcing the government to undertake new lines of inquiry.

But, notwithstanding this inquisitiveness of the American people, which makes this country a more hopeful field for statistical inquiry than Europe, it must be admitted that comparatively little attention has been given to statistics as a science, or even to a study of statistical methods. Indeed, it was not until recent years that book-makers have been willing to concede the necessity of resting their arguments on observed facts. This change of front is most significant. Regard for facts is usually in inverse ratio to regard for theory; or, better stated, it is not till hypothetical reasoning loosens its hold on the mind of the student of society that he feels the need of formal investigation into the facts of social life. It is because reasoning from assumed premises was unable longer to command the confidence of the public that students have addressed themselves to the more difficult task of reasoning from the premises which statistics alone can furnish.

But the time has now come when the statistical method is beginning to receive considerable attention from students, and the appearance of this monograph by Professor Richmond Mayo Smith, on "Statistics and Economics," may be cited as evidence. This pamphlet is the first publication of its sort in the United States. Its purpose may be best given in the language of the author: "The following monograph," he says in the preface, "is neither a hand-book of statistics nor a text-book of statistical science. It does not pretend to give full data on any subject, or to discuss all the questions of statistical method and procedure. It is merely an attempt to put, briefly, into English that conception of statistics which regards them not merely as information, but principally as contributions to the building of a social science."

The treatise is divided into four chapters. The statistical method is first considered, a comparison being made between it and the historical and comparative methods of studying social science. This is followed by an "outline of statistics," this subject being treated under three heads,—the statistics of population, economic statistics, and the statistics of vice and crime. In this Prof. Smith follows the usual method of classification. The third chapter presents the relative merits of the English and the continental view of statistics,—the former considering them as a method of investigation, and the latter as comprising a science. The last point considered is the vexed question of the freedom of the will as viewed in the light of statistical laws. It thus appears that, although the treatise is not exhaustive, it is yet comprehensive.

Now, there is very little to say "in review" of such an essay as this. It confines itself almost wholly to exposition. It is intended as a guide to further study. It is a classification for a line of inquiry. And, as every reviewer knows, the better a book of this kind is the less is the opportunity afforded of saying anything about it. This is the embarrassment under which one labors who undertakes to review this treatise on Statistics and Economics. It is a scholarly piece of work, concise in statement, and clear in classification. Indeed, its peculiar merit is that, unlike most guides to study, its classifications are a help and not a hindrance.

There are two questions on which Prof. Smith expresses an opinion. These have been suggested by the headings of chapters stated above. In the first place, he is inclined to the position of Engle, Block, and Bodio, representatives respectively of German, French, and Italian statisticians, and chooses to regard statistics as a science. The view opposed to this is that of English writers, who fail to see in statistics anything more than a scientific method. "I regard statistics," says Mr. Hooper, "as a method of scientific inquiry, a certain instrument of scientific investigation, whether it is applied to sociology, to meteorology, or to any other science. * * * * In the service it renders to man it is analogous to the microscope, which enables us to see magnitudes, and to the polariscope which enables us to perceive tints that are not otherwise perceptible to us."

Continental writers, on the other hand, insist on separating the statistical method, as applied to natural science, from its use as applied to social science. The former is conceived as a method

merely, the latter is conceived as creating a science. Statistical science would be defined by them as a branch of social science distinguished by its method. It is not proposed to discuss the merits of these opposing views, or to show on what grounds continental scholars distinguish between statistical method applied to the natural and to the social sciences. Prof. Smith, as already remarked, inclines to the view of the continental publicists, saying they were driven to this classification by the necessities of the case. My own experience in the teaching of "the science of statistics" has not been extended, but as far as it goes it inclines me to dissent from Prof. Smith's conclusions. Beginning my study under the direction of continental writers, I was obliged to modify my position before the close of my first course of lectures. It was impossible for me to use the word science naturally and easily, and in conformity to my previous custom, when applying it to a method of getting at facts; and to select a certain class of facts, as constituting a science of statistics, while excluding other phenomena to which this method of inquiry also applies, seemed to me arbitrary and without sound reason. But probably the real difference lies in the idea one accepts of the nature and meaning of the word science, and perhaps, also, in the view adopted of the extent and scope of sociology. A particular question of this sort is always bound up in the general classification of knowledge which all, either consciously or unconsciously, must have adopted.

With regard to the second point suggested above, the relation of statistics to the freedom of the will, the reader is referred to its concise discussion in the text of the monograph. The conclusions there reached will commend themselves to all who are familiar with the expression of tendencies by means of "statistical laws." This monograph will be of marked assistance to those in our colleges or universities who are giving instruction on statistics. It will serve well as a hand-book for students to follow in connection with a course of lectures upon the subject.

HENRY C. ADAMS.

GILMAN'S PROFIT-SHARING.

Profit-Sharing between Employer and Employee: A Study in the Evolution of the Wages System. By Nicholas Paine Gilman. Pp. 460. Houghton, Mifflin & Co. 1889.

This book, above all, is to be recommended for its freshness. Not only is it thorough and complete in its treatment, but it is essentially modern. For the past eight or ten years the experiences of the Messrs. Briggs in England, of Godin's Social Palace at Guise, and of the Maison Leclaire in Paris, have been the chief stock-in-trade of economic reformers who have advocated the system of profit-sharing.

It is gratifying, therefore, to know that henceforth additional illustration can be furnished for argument, and illustration, too, which is more varied and more native in its characteristics. Students of the wages question have been aware, for some time, that Mr. Gilman was preparing a monograph on this subject, but we doubt if any anticipated that the result would be so fruitful. The investigation has been exhaustive, and the work is not a mere re-statement of the conclusions of Bohmert or Sedley Taylor. It is a notable example of an inquiry essentially statistical in its nature, carried on by private undertaking and industry. The author has made not only an original inquiry for our own country, but he has invaded Europe itself, and gathered independently all the examples of profit-sharing which can be found either in England or on the continent. A brief introductory portion of the book is devoted to a survey of the system of product-sharing, which formerly obtained in agriculture, fisheries, and mining; and to a description of the various forms of the present wages system. There is little attempt to theorize or dogmatize. Definition and explanation are given, that the reader may the better understand the fuller treatment of profit-sharing. This appropriately begins with a detailed account of the experiment of the "father of profit-sharing," M. Leclaire, followed by chapters on the profit-sharing system on the continent; profit-sharing in transportation, distribution, and agriculture; industrial partnerships in England; the experience of America; past experience with its failures; statistical tables, and the argument for profit-sharing. Throughout the work is characterized by a tem-

perate and scientific spirit. The author is conservative in his positions. He has "no hostile feeling towards the wages system," and co-operation he regards as too revolutionary a substitute for the present method.

Apparently, Mr. Gilman would have no criticism for the present wages system if it were not for the disturbances in industry occasioned by strikes and industrial warfare. The author places himself in the position of the employer, and seeks to discover whether profit-sharing in any of its various forms is sound financially, or whether by its adoption production may or may not be increased, and the profits therefore of the entrepreneur enlarged. If stability be introduced, strikes eliminated, waste decreased, and greater diligence be developed, then profit-sharing is a sound scheme for the employer to consider. Whatever may be Mr. Gilman's views on this point, he is undoubtedly wise in making the appeal to self-interest so prominent, even perhaps to the exclusion of all other considerations. The final analysis, however, must be founded on equity as well as expediency.

From Mr. Gilman's investigations it appears that there are in existence 135 cases of profit-sharing in Europe and in the United States. These have been in successful operation for periods varying from one to forty-seven years.

From Table II the classification of cases according to the length of the trial of participation is here inserted: —

No. of Years' Trial.	No. of Instances.	No. of Years' Trial.	No. of Instances.
40	7	5	21
30	5	3	21
20	14	2	16
15	30	1	4
10	15	No date given	5

The reckoning is to the present year, 1889. There are thus 129 cases which are now in their second year or over.

Going more into detail, we find, in France,—

No. of Years' Trial.	No. of Instances.	No. of Years' Trial.	No. of Instances.
40	5	5	12
30	4	3	6
20	5	2	2
15	14		
10	9	In all	57

In Switzerland,—

15 years' trial or more	8 instances.
10 years' trial or more	2 instances.

In Germany,—

No. of Years' Trial.	No. of Instances.	No. of Years' Trial.	No. of Instances.
40	2	5	1
30	1	3	2
20	5		
15	6	In all	18
10	1		

In England,—

10 years' trial	1 instance.
5 years' trial, or less	7 instances.

In European countries other than those named,—

5 years' trial, or more	7 instances.
2 years' trial, or less	1 instance.

And in the United States,—

6 years' trial, or more	6 instances.
2 years' trial	24 instances.
1 year's trial	2 instances.

In some of the industries the number of participants in profits is very large, but the author takes occasion to show that "the size of the establishment has little to do with the applicability of profit-sharing," for there are instances of concerns with but ten or a dozen men. Nor does there appear to be any clear line of separation among industries, which will indicate that profit-sharing has a restricted or special sphere. Noteworthy examples are given where this system has been successfully applied to industrial workers of a low grade of intelligence. An interesting generalization is made in the statement that profit-sharing has been more successful in France and the United States, due, perhaps, to the more democratic instincts in these countries; while in Germany, the nation of theory and speculation, the home of scientific socialism, there has been but a small and slow increase in the number of these experiments. The conservatism of England has also operated against the spread of profit-sharing.

One of the most valuable features of this book is the narrative of the abandonments of profit-sharing. These are carefully described and analyzed, and this genuine and thorough analysis must be of immense

advantage to any employer who contemplates the introduction of the method. There is no attempt to conceal mistakes, just as in the narrative of the successful experiments there is no wish to exaggerate the beneficial results. There are also explained the various systems of profit-sharing finance, with a mass of information in regard to the several sorts of bonuses, pensions, annuities, etc. The book concludes with a satisfactory bibliography of the subject, and with an index which may be recommended to book makers as a model in its completeness.

DAVIS R. DEWEY.

STATE HAND-BOOKS.

Resources of Dakota. Compiled by the Commissioner of Immigration, under Authority Granted by the Territorial Legislature. Containing descriptive statements and general information relating to the soil, climate, productions; advantages and development; agricultural, manufacturing, commercial, and mineral; the geography and topography of the territory. The vacant public lands, and how to obtain them; together with diagrams, statements, tables, and summaries, showing the products and progress of the Territory, and of each county, separately. Territory of Dakota, Department of Immigration and Statistics. P. F. McClure, Commissioner, Pierre. 1887. Pp. 493.

Alabama As It Is; or, The Immigrants' and Capitalists' Guide Book to Alabama. Furnishing the most accurate and detailed information concerning the varied elements of wealth in Alabama, whether of mine, field, or forest; together with carefully-prepared maps and charts, illustrative of the numerous advantages possessed by the State. By Rev. B. F. Riley, D. D. Adopted by the State by an Act approved February 18, 1887. Second edition. 1888. Pp. 304.

First Annual Report of the Agricultural Bureau of the Department of Agriculture, Insurance, Statistics, and History. 1887–88. L. L. Foster, Commissioner. Austin, 1889. Pp. lv, 318.

In looking over reports of this nature one must always remember that the compilations are not entirely disinterested; that they are usually designed for encouraging immigration and advancing the material interests of the several localities. Nevertheless, the Commissioner of Immigration of Dakota, considering the "worse than useless law governing the gathering and compiling of statistics," has brought together much statistical information which is interesting as throwing light upon the economic and social development of a new community. Naturally, the original data have been largely supplemented by material heretofore given in United States reports. The meteorological tables are of considerable interest; calculations are made which show that in no month of the year does the weather average so cold in Dakota as in either Minnesota or New Hampshire. These weather records were transcribed expressly for this work from the original reports of post surgeons of the War Department, and go back as far as 1872. The mortality statistics are exceedingly questionable, for, in 1885, it is calculated that the death rate was but 6.01 per thousand, or one for every 166 of the population. In some cities the population approaches even more closely to this condition of immortality. It may be remarked that as long ago as 1880 the death rate in Minnesota was at least one in 86 of the population, and probably considerably more. The moral virtue of Dakota is upheld by the statement that in 1880 the territory had fewer criminals than any state in the Union. No comparison, however, is made between Dakota and other territories.

The Alabama hand-book is more descriptive and not so statistical, nor are the statistics presented of a late date; for the most part the compiler has been content with the results of 1880. On the other hand, the book is prepared in a calmer spirit, and there is less of the superlative spread over its pages. It is, however, the boast of Alabama that "the rate of death is less than the aggregate of the United States." This report contains less of social interest than the others, for its chapters are devoted chiefly to economic resources.

The Texas report is perhaps the most ambitious document of the list. The information was collected by law by tax collectors of the counties, by means of blanks. This method is always open to question, owing to the suspicious attitude of the farmers, who fear additional taxation, — and it appears that such opposition has injured in some degree this report. It is believed, however, that the critical

period is passed, and henceforth there will be shown a greater willingness. This hand-book is not designed to be a "praise-book," and the "utmost care has been to ensure accuracy." Assessors were also placed under oath. The period covered relates to 1887. In addition to usual statistics of wealth, the tables include criminal, vital, and social statistics. "The table showing the number of criminal cases tried in courts of record, for the period of five years ending December 31, 1887, and now disposed of," is full of striking interest. For murder there were 2101 indictments, 1282 trials, 558 convictions; for all felonies there were 24,054 indictments, 11,610 trials, and 6296 convictions.

ANTHROPOLOGICAL RECORDS.

An Anthropometric Manual, giving the average and mean physical measurements and tests of male college students, and methods of securing them. Prepared from the Records of the Department of Physical Education and Hygiene in Amherst College during the years 1861–62 *and* 1887–88, *inclusive. Second edition.* By Dr. E. Hitchcock and Dr. H. H. Seelye. Amherst, Mass. 1889. Pp. 37.

Anthropometric Statistics from Amherst, Mass., U. S. A. Journal of the Anthropological Institute, November, 1888. Pp. 192–199.

School Records of Physical Conditions. By C. F. Crehore, M. D. *Education, February*, 1889. Pp. 399–402.

The Anthropometric Tables of Drs. Hitchcock and Seelye have been revised, owing to the increased demand for such data. It is stated that —

The beginning of the scheme followed at Amherst College is to be found in the eight items of age, weight, height, chest girth, arm girth, fore-arm girth, lung capacity, and pull-up, which were secured from every student in Amherst College, since 1861 till about the year 1881, when more elaborate and multiplied items were suggested by Dr. W. T. Brigham, of Boston, which were much better methodized and arranged by Dr. D. A. Sargent, of Harvard College, and first used here in 1882.

In 1885 the American Association for the Advancement of Physical Education, at a meeting in Brooklyn, appointed an Anthropometric Committee, consisting of Dr. D. A. Sargent, of Cambridge, Dr. E. Hitchcock, of Amherst, and Dr. W. G. Anderson, of Brooklyn, to propose a uniform method of taking and securing these statistics. At the meeting of the Association, in 1886, this report was made, accepted, and adopted by the Association, a copy of which follows the tables in this pamphlet. And it is this method which is practically used at Amherst today, as the fundamental parts of it have been used for the past twenty-six years.

The first table offers to the student the series of measurements and tests of men in college who have been exactly of *his own height*,—within a centimeter, or about half an inch,—and with no reference to any other bodily characteristic as a standard. This is considered a more reliable and unchanging criterion than is that of age, weight, or the showing of means or averages, since bodily proportions in the average man will be much more controlled by height than by any other datum.

The second table gives results the most comprehensive of all the tables offered. This embraces certain statistics secured from all the students who have been connected with the college since 1861–62. These, added together, and divided by the number of students furnishing them, gives us an average or approximate ideal of what an Amherst student has been for a quarter of a century.

The third table is based entirely upon the element of *age*, which characteristic is much modified in the individual by both present and past surroundings of life.

It will be observed that the succession of items here is not so perfect as it is in the table of height, partly because of a smaller number of students observed, but mainly owing to the fact that age is probably not so good a basis of comparison for the physical measurements.

The fourth table is prepared by grouping together the items and arranging them by their simple *numerical quantities*. Taking, for example, the item of *height*, and placing together the shortest student, measuring, say 1600 m. m., we shall find but a few of these. Then selecting those who measured 1610 m. m., we shall find a few more individuals, and so on, till we reach a point at which the numbers begin to fall off, till we reach the very tallest persons, who will be, say 1830 m. m., or six feet, the tallest men. This point at which we have found the greatest number of the series, or the top of a curve, is 1725 m. m., or 67.7 inches. This, we say, is the mean or medium height of a student of Amherst College, a point or a criterion, all deviations from which may be regarded as deviations from a standard, since it represents the largest actual number of objects in this group of characteristics. By thus grouping all of the fifty-four items observed, the Table No. IV is constructed. Or, if represented by an upward curve, the lowest and highest objects will place themselves

at the ends of the curve, and the one which has the largest number of representatives at the top of the curve, the medium, or mean, will be at the height of the curve. In this table the right and left members are averaged for the result.

Table No. V is mainly of college interest, as showing the difference in classes. And the fact is shown that the growth and increase is more conspicuous during the early than the later college years. The physiological truth is also corroborated that bodily growth is mainly attained before the period of majority, as is always recognized in civil law.

In the article published in the *Journal of the Anthropological Institute*, Dr. Hitchcock, at the request of the editor, Mr. Francis Galton, has extended his calculations so as to be more serviceable to anthropologists, and to "serve at least two purposes, the one to show the average variability of each characteristic, the other to show their interdependence." They also show the distribution of any faculty among the individual members of a group. The tables are thirteen in number, and refer to the height of body, the height of navel, the height of knee, sitting height, girth of head, breadth of head, breadth of shoulders, breadth of hips, length shoulder-elbow, length elbow-tips, length of feet, stretch of arms, and lung capacity.

In *Education*, Dr. Crehore advocates "a plan for keeping a school record of the mental and physical condition for each scholar, at the date of his admission, and as developed during school life." A table is appended, which it is suggested may be used as a schedule.

SWANK'S IRON AND STEEL REPORT FOR 1888.

Statistics of the American and Foreign Iron Trades for 1888. *Annual Statistical Report of the American Iron and Steel Association, containing complete statistics of the American Iron Trade for* 1888, *compared with* 1887, *and a brief review of the present condition of the iron industry in foreign countries. Presented to the members, April* 1, 1889. Philadelphia. 1889.

This annual report, it is stated: Contains, for 1888, full statistics of the production of iron ore, pig iron, all kinds of steel, and all kinds of rolled iron and steel in the United States, in the year mentioned, together with tables of the prices of leading iron and steel products, and of our imports of iron and steel and iron ore, and our exports of iron and steel, in the same year; also much useful information concerning the development of our coal industry in 1887 and 1888, railroad construction, the building of iron ships, and immigration in the same years. Detailed information on all these subjects, and on some related subjects, for a long series of years, ending with 1887, has already been published in our Statistical Abstract, issued in 1888, and is therefore omitted from the present Annual Report, as it was omitted from the Report of 1888.

In the present Report less space is devoted to a review of the foreign iron trade than has been devoted to this subject in some previous Reports. The principal reason for this contraction of space is the growing and entirely reasonable demand for the prompt publication of domestic iron and steel statistics.

Without attempting to review the contents of this report, it may be noted that in the presentation of the statistics there are some minor changes from former issues, as, for example, in estimating the consumption of pig iron in the United States. For many years the consumption of pig iron in the United States has been estimated by adding the home production and the unsold stocks at the beginning of the year to the quantity imported, and subtracting the stocks of domestic pig iron unsold at the close of the year. Occasionally, when they have been of sufficient importance, there has been taken account of the stocks of foreign pig iron unsold and the quantity of domestic pig iron exported. At the close of each of the years 1887 and 1888 the quantity of foreign pig iron in bonded warehouses, and not sold, was so small that it was not considered, and the exports of pig iron in the same years were not considered for a like reason.

The statistics of our annual consumption of pig iron, therefore, did not fully show our consumption of iron itself. To these figures there have now been added the large quantities of old and scrap iron, both of domestic and foreign origin, which annually take the place of pig iron, and there is also added the blooms from ore which are annually produced in the Catalan forges of the country. Our heavy importations of manufactured iron and steel, in all forms, are also added. The consumption of iron and steel, in each of the years 1887 and

1888, certainly exceeded 8,000,000 gross tons, instead of the estimates of 6,808,386 and 6,688,744 tons, respectively, obtained by the old method.

We have annually, for several years, consumed more iron and steel than any of the great European countries. The *per capita* consumption of iron and steel by the United States is also greater than that of any other country. In 1887 our consumption of finished iron and steel exceeded 300 pounds *per capita*, estimating our population for that year at 60,000,000. In 1888, however, our *per capita* consumption declined to probably 285 pounds.

Another new departure is the determination of the wire-rod production of the United States, which has never before been definitely ascertained. In 1888 this was 313,341 net tons. Pennsylvania and Ohio each made a little over one third of the total production, and Massachusetts made the larger part of the remainder.

UNIFORM RAILWAY STATISTICS.

On March 5–7, 1889, a conference of members of State Railroad Commissions and certain officers of the American Railway Accounting Association, was held at Washington, to discuss the subjects of railway statistics, classification of freight, railway legislation, and railway construction. At this meeting Henry C. Adams, Statistician of the Interstate Commerce Commission, read a paper on Uniform Railway Statistics, which is published in a report of the proceedings, issued by the Interstate Commerce Commission. This paper is substantially as follows: —

In the circular of January 31, inviting the Railway Commissioners of the various States to participate in a general conference, the subject of uniform railway statistics was given the most prominent place among the topics to be discussed. This probably was by design on the part of those who arranged the programme, and the readiness with which the invitation was accepted may be taken as indicating some degree of interest in this subject. My own experience in the

practical work of compiling statistics has not been extended; it has, however, been ample to convince me that without a common understanding on the part of those engaged in this line of investigation, results cannot be expected at all commensurate with energy expended. Uniformity of method is a matter of such vital importance to the satisfactory performance of the tasks which government has entrusted to the hands of the several railway commissions that this convention ought to be unwilling to separate until some definite plan has been adopted for harmonious and co-operative statistical work. The few words I have to say will be directed by this purpose.

Permit me, then, at the outset to call your attention to certain advantages sure to arise from the adoption of uniform methods of collecting and presenting railway statistics in the United States. These advantages are of three sorts. In the first place, uniformity of procedure presents the only feasible plan by which accuracy of conclusions may be ensured. In the second place, unless statistics are compiled according to uniform rules it is impossible to use conclusions arising from them for comparative study. And, lastly, it will be very difficult to arrive at complete statistics unless the State Commissioners are willing to co-operate with the statistical department of the Interstate Commerce Commission. Let us look at these points a little in detail.

The first claim for a uniform rule in statistical inquiry is that it presents the only feasible plan by which accuracy in conclusions may be ensured. Consider, by way of illustration, the question of railway mileage. Here, certainly, one would say, is a question of simple measurements, and it is the fault of the statistician if his conclusions are not correct. Without denying the responsibility of the statistician, a moment's consideration will show the question of mileage to be less simple than it at first appears. A great railway corporation is a very complex affair; it is divided into many departments for administration and control, and it is of considerable importance to the statistician which department furnishes the facts to be compiled. Thus the figures on mileage may come from the auditor or from the engineer, and it is by no means certain that the returns made by the chief engineer will be the same as those made by the financial officer. Discrepancies arising from this cause have so frequently occurred in the experience of our office that they have ceased to be the occasion of surprise.

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But a more serious source of error presents itself when we notice that the difference between length of line operated and length of line owned is not always kept in view by the officers of roads making reports. Of course the total mileage in the country must equal the sum of the miles of line owned by each and every corporation in the country. Should any company report as mileage owned, mileage which it operates, or controls, there would arise a duplication which

would vitiate all results. This is very simple and clear when thus presented; and, so far as I am aware, all the reports of the State Railway Commissions recognize the danger, and endeavor to guard against it; but your experience must be very different from that of this office if you have succeeded in satisfying yourselves that your figures represent things exactly as they are. In the first place, trackage rights present a class of embarrassing questions. It is not possible to be sure in all cases that a strip of road used by several companies is not included in the total returned by each. We have quite accidentally discovered a few cases of erroneous returns of this sort by observing in the expense account an item charged as rentals for trackage rights, although no trackage rights were mentioned in mileage operated. Similar to this is the case of several companies owning jointly a strip of track; one makes return of its portion as part of its mileage owned, while the report of the other road makes no mention of the fact whatever. Another source of embarrassment presents itself in connection with "proprietary" relationships existing between operating and subsidiary roads. Expressions like "proprietary ownership" or "ownership through control of majority of stock," are by no means infrequent in the reports made by the various roads, a fact which gives rise to some uncertainty as to the exact meaning of the figures returned under the heading, "length of line owned." It is very easy for mileage to be duplicated by crediting to the roads which claim "proprietary ownership," or "virtual ownership" mileage already accounted for as the property of the absorbed company.

One word more on this question of mileage. A common way of estimating the total railway mileage of the United States is to take from the reports of the State Commissions the mileage of each State. Nothing could be simpler, assuming the several amounts thus summarized to be correct. But on this point, also, the experience of this office is not such as to warrant perfect reliance upon such figures. Turning to page 27 of our Form, you will notice that each company is expected to apportion its mileage to the several States through which its line runs. What is wanted here is the assignment of "Total Mileage" as returned by operating roads, to the several States. It has been found necessary to return for correction more than one hundred books, because some other figure than total mileage was accepted as the basis of apportionment. Assuming that the State Commissions have met with similar difficulty, there is no guarantee, except in the care exercised by the Commissioners, that the sum of the mileage thus apportioned will accurately represent the length of line in the United States, or that the total mileage for the United States, so far as it is computed for State Reports, will be absolutely correct.

In what way is it possible to overcome the difficulties thus suggested, and arrive at conclusions worthy of confidence? It is no

answer to say that care should be exercised by those who compile statistics. That goes without saying. What is needed is some proof of the accuracy of conclusions; some test so that we may know when adequate care has been exercised. Now the only test of accuracy in the compilation of statistics is harmony of results when those results have been arrived at by different methods or by different persons using the same methods. Such a test, however, cannot be applied unless there is general uniformity in statistical methods; that is to say, uniformity as to the primal facts gathered, uniformity as to the meaning of all questions put to the railway companies, and uniformity as to the theory on which the items that make up totals are classified. This, then, is the first argument for the adoption of uniform methods of statistical inquiry by the State Commissions and the Interstate Commerce Commission. It is essential in order to provide a test for the accuracy of facts. It will be a most fortunate thing for railway statistics in the United States if this convention shall adopt a scheme by which the conclusions of the State and Federal railway commissions may be checked against each other.

The second advantage of uniformity in statistical inquiry, as above suggested, springs from the fact that statistics yield their best results when made the basis of comparative study, and that without uniformity in method no comparison is possible. This point might be presented at length by discussing the theory of statistics, but I choose rather to bring it before you by means of two or three practical illustrations.

One of the important questions in railway economy pertains to the amount of capital stock and bonds that are issued per mile of line. The question of fair rates is more intimately connected with the amount of property per mile than with any other one element that enters into the problem. But, you will say, this is a simple matter. It is only necessary to divide the total mileage by the total of bonds and stocks, and you will get the average debt burden per mile of line. This sounds reasonable, but it may be doubted if conclusions so obtained would be of much real value. One of the rules of statistical science is that classification of facts must always precede their compilation or reduction, otherwise the averages arrived at will be typical of nothing in particular. An average that does not spring from homogeneous facts cannot be accepted as a normal measure of the forces responsible for them, and cannot, in consequence, serve as the basis for comparisons for cases which show widely-varying results. But the chief practical aim of statistics is to discover a normal rule so that abnormal results will quickly arrest attention. It thus appears that an average made without due regard to classification of the facts which it assumes to represent is utterly worthless for purposes of investigation. Applying, now, this general conclusion to the question in hand, it follows that considerable attention must be given to the classification of the conditions under which railways may be built, before an average of stocks or bonds issued per mile of line can have

any pertinency for practical discussion. It is on this point of classification that uniformity must be observed by all bureaus of railway statistics, since comparison would otherwise be impossible. So clear a proposition needs no further comment.

But there is another reason also why those who control railway statistics should come to some common understanding with regard to the per-mileage estimate of stock and debt, for the truth is there are several ways in which this estimate can be made. Upon page 7 of the blank Form issued from this office the railroads were requested to apportion their stock, their funded debt, and their floating debt on the basis of mileage. The various ways in which this could be done, and yet preserve the letter of the requirement, was to me a very embarrassing revelation, although, without doubt, each auditor made the returns according to the method of book-keeping in his own office, or as he thought best fitted to present the peculiar conditions of his road. Some apportioned bonds and stock on the basis of mileage owned or operated, while debt was apportioned to the length of line mortgaged as security for the debt. In some cases the amount of stock owned by a proprietary company in a subsidiary road was included in the total stock apportioned, a method of procedure which would of course lead either to duplication of stock or to a deficiency of stock, according to the report of the subsidiary road. Now, assuming that our experience with this question is typical of the experience of other offices engaged in similar work, is it not clear that a comparison of the amount of stock and debt per mile of line in one state with the corresponding item in another state may be wholly misleading? Each office undertakes to adjust the discrepancies according to rules which itself adopts, and a comparison of bonded debt between various roads in the same state may lead to valid conclusions; but when this comparison passes beyond state lines there is no adequate guarantee that the results compared represent the same classification of facts. Manifestly, here is a point with regard to which a common rule for the compilation of averages is essential for valid conclusions.

Another illustration of the fact that uniformity in method of inquiry, or what amounts to the same thing, harmony in classification of facts inquired into, is necessary for purpose of comparative study, may not be out of place. A prominent railroad paper, commenting on the preliminary report issued from this office, called attention to the small percentage of railway capital assigned as circulating capital. The figures of this report show that about three per cent of the total of capital devoted to the railway industry exists outside of fixed investments or funded debt, while, says the writer in the paper referred to, the true amount is over five per cent. In all probability this difference does not pertain to the fundamental facts in the case, but arises from a different method of classification. The criticisms of this paper, which were friendly and therefore helpful, led me to look into the reports of the various state commissions, to see if there was

any uniformity in the management of this item of unfunded debt. The result of that inquiry is instructive, for it shows that this item did not in any two cases represent exactly the same thing, and therefore that the totals of circulating capital, as returned in these reports, are useless for purposes of comparative study. I repeat, then, it is essential that we come to some common understanding as to the meaning of the phrases we employ.

The third consideration, favoring harmony of action in statistical inquiry between the various railway commissions, is that such action is necessary, or at least highly desirable, in order to arrive at a complete and comprehensive presentation of facts. The truth of this claim rests in part on the peculiar relation that exists between federal and state authority, and in part upon the nature of the questions to be investigated. There are a few lines of inquiry, essential to a comprehensive portrayal of inland traffic, which lie outside the authority conferred by Congress upon the Commission, but over which the commissions of the states have undoubted legal control. The embarrassment experienced on this account would be greatly diminished should all interested in railway statistics come to a common understanding as to the form of inquiry to be pursued; since, in that case, it would be possible for the Interstate Commerce Commission to supplement its facts by facts gathered under the supervision of the State Commissions. Provided only the matter appears of sufficient importance, much more complete and satisfactory results may be attained for all concerned by co-operative work between the various commissions than by isolated and disjointed inquiry. Or if we consider the nature of the question to be investigated, the same conclusion is reached. There are many things which it is impossible to investigate from a distance, because they call for detailed knowledge of all the facts in the case. An illustration will show what is meant. It is of some importance that the entire amount of property devoted to the business of inland transportation should be known. It is incorrect to assume that this property is truly represented by railway bonds and stocks; for, as a matter of fact, there are, in addition to interest and dividends, quite a number of items charged to operating expenses, or to fixed charges, that are payments on property devoted to inland traffic. Consider for a moment the number of independent bridge companies, depot companies, terminal facilities, elevator and storage companies, stock-yard companies, and the like, all of which are supported out of payments made for transportation, and all of which should be accounted for in complete statistics of property devoted to inland traffic. Without doubt it would be possible for a single Bureau to make up a complete list of this property, but such a task would be greatly facilitated by the assistance of the State Railway Commissions. Similar conclusions would be arrived at if we were to consider car-trust obligations, a form of railway indebtedness most confusing on account of the great variety of contracts that go under

that name; or certificates issued by receivers of insolvent roads, which present many difficulties to the statistician.

In matters of this sort, co-operative inquiry, conducted according to some common plan, would remove obstacles which otherwise seem almost insurmountable. The chief benefit might perhaps accrue to the Interstate Commerce Commission, charged as it is with the duty of collecting complete statistics for the entire country, but it by no means follows that the service would be wholly one-sided. The State Railway Commissions would certainly be assisted in the performance of their various duties by such co-operation as is here suggested. This railway problem is in no sense of the word a local problem. Only a few cases present themselves to the consideration of commissions which do not demand a somewhat comprehensive view of the facts of railway management. It would be of great advantage to the State Commissions to be able to compare the items that go to make up the totals of property devoted to traffic in their own state with corresponding totals in other states, a comparison that is out of the question unless the investigations of all proceed according to the same plan. It is then the results that must flow from assistance rendered by the State Commissions which will compensate them for the interest they show in the broad work undertaken by the statistical service of the Interstate Commerce Commission.

Assuming the need of co-operative work according to some uniform plan is a thing to be desired, what steps are to be taken to attain this end? Before making definite proposals it may be well to inquire to what extent railway statistics now recognize a common purpose. In undertaking to answer this question I first consulted the laws of the various states by which railway commissions are authorized; and the impression left by the study was that, so far as law is concerned, the liberty granted in statistical matters, as well as the specified duties imposed upon the State Commissioners, provides ample opportunity for harmonious methods of procedure. The laws of the various states seem to be drawn on the same general model.

A better way, however, of discovering the degree of statistical harmony that exists is to compare the statistical work put forth in the State Reports. The law shows what the Commissioners have the liberty of doing; the reports show what under the law they have chosen to do. Now a superficial examination of these reports would leave the impression that there is divergence at every point, and that it would be impossible to use them for purposes of comparative study; but a little more care discloses the fact that the differences pertain to method of presentation, while the data given, as well as the fundamental idea that has directed its collection, are about the same in all cases. This is a most encouraging disclosure, for it shows that the groundwork of harmonious investigation has already been laid, and that it is only necessary for us to adjust the details of the several plans to some common idea.

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It need hardly be said that a system of statistics which fails to recognize some common unit of measurement for the forces studied can serve no rational purpose. Now the unit adopted by the best authorities in railway statistics is the ton-mileage or passenger-mileage unit, and it is a matter for congratulation that all of the State Commissions, with two exceptions, reduce the traffic figures which they present to this common basis; and in these two cases this common basis of measurement will undoubtedly be adopted when their statistical work is developed sufficiently to allow of general reductions. In this respect American Railway Statistics are in advance of those of England, which still accept train-mileage as the unit of measurement. It seems, then, that the problem of establishing uniformity of railway statistics in the United States is by no means a difficult one. The first steps in that direction have already been taken, and it is only necessary to go with care over certain matters of detail so as to come to a common understanding as to the exact meaning of such inquiries as are made, and adopt common theories for the classification of items. Permit me to suggest one or two points that call for immediate attention.

The first point that should be considered pertains to the date adopted for the close of the fiscal year. As matters now stand, ten of the Commissions accept June 30 as the close of the fiscal year; six states have accepted September 30, five states have adopted December 31, one state calls for quarterly, and one for monthly, returns.

Now, if the statistical results of the State Commissions, and of the Interstate Commerce Commission, are to be used as checks each against the other, it is essential that the financial year adopted as the basis of returns should be the same for all. There are certain advantages in accepting June 30 as the date for closing books, but as this question has received so much attention of late, I will do no more at this time than to suggest it for yet further consideration.

Another topic that should be considered by this convention pertains to the classification of operating expenses. There are now twelve states that have adopted what is known as "The Saratoga Classification," which, as you are aware, was drawn up by a conference of State Railroad Commissioners in Saratoga in June, 1879. So far as I am aware, no general complaint has ever been urged by the auditors of the various roads with regard to this classification. It seems to be as simple as the subject admits of. Many auditors have, during the last year, adjusted their accounts to its requirements, and it is believed that formal action by this convention, favoring this classification, is all that is needed to lead to its universal adoption. Certainly if this be the case, arguments in favor of such a step are not needed. It is absolutely essential for attaining the best results, that operating expenses be reduced to uniform classification.

In close connection with classification of operating expenses stands

the division of expenditures between "expenses of operation" and "fixed charges." The rule adopted in this office is to assign taxes to fixed charges, and for all general problems in railway economy there are many reasons favoring such a classification. But the reports of the states show no uniformity on this subject. In some cases taxes are classed as fixed charges; in some they are included in operating expenses, while other reports keep them separate from both items. It would add greatly to the ease with which these reports could be used, should some uniform rule of treatment be adopted. Another question deserving consideration pertains to the rule for estimating the deterioration of railway property through wear and tear. There seems to be almost total absence of uniform action on this point, while many roads apparently omit this altogether from their accounts; and yet, when we consider the case with which facts of this nature may be collected, provided only a proper method of book-keeping be adopted by the railways, and when we notice what direct bearing the rate of wear on rolling stock has on questions of railway economy, the omission is a little surprising. The reverse of this question is that of betterments and improvements. A great deal of attention has been given to the proper method of accounting for moneys expended in permanent improvements or applied to reduction of indebtedness; and, as is well known, the question involved is one that is decided differently by different states and railway administrators. So far as a railway is concerned, it depends largely upon the financial policy adopted whether permanent improvements are charged to operating expenses or to the improvement account. The public certainly ought to make no complaint if the latter method is adopted. At the same time, when the use to be made of statistics is held in mind, accounts should be kept so as to allow of some degree of uniformity as to the meaning of operating expenses. This is a difficult matter to adjust, and should receive the careful attention of those interested in railway statistics.

It is unnecessary to follow this subject further, or to suggest more of the topics that call for detailed discussion. There can be no question of the desirableness of uniform railway statistics in the United States, and, as has been discovered, the degree of uniformity that now exists is such as to encourage further steps in the same direction. It only remains for the members of the Convention to consider with care which steps should be taken first, and in what manner the desired end may be most easily attained.

STATISTICS OF THE AMERICAN NAVY.

In Swank's *Report on Statistics of the American and Foreign Iron Trades, for* 1888, there is published a brief article on "The New American Navy." The greater part of it is here reprinted: —

All the vessels for the new navy, except five partly completed iron monitors, are or will be built of steel. After long delay the completion of these monitors has recently been authorized. Their keels were laid in 1874 and 1875. They are armored and double-turreted. Each monitor is to have four 10-inch breech-loading rifled guns in its main battery, and several rapid-fire and Gatling guns in its secondary battery.

Name of vessel.	Type.	Condition.	Displacement. Tons.	Main Battery.	Thickness of side armor.
Texas	Belted	Prep'ring ways	6,300	2 12-inch 6 6-inch	12 inches.
Maine	Belted	Building	6,648	4 10-inch 6 6-inch	11 inches.
Chicago	Protected cruiser.	Commissioned.	4,500	4 8-inch 8 6-inch 2 5-inch	Unarmored.
Boston	Protected cruiser.	Commissioned.	3,189	2 8-inch 6 6-inch	Unarmored.
Atlanta	Protected cruiser.	Commissioned.	3,189	2 8-inch 6 6-inch	Unarmored.
Dolphin	Dispatch vessel	Commissioned.	1,485	1 6-inch	Unarmored.
Newark	Protected cruiser.	Building	4,083	12 6-inch	Unarmored.
Charleston	Protected cruiser.	Launched.	3,730	2 8-inch 6 6-inch	Unarmored.
Baltimore	Protected cruiser.	Launched	4,413	4 8-inch 6 6-inch	Unarmored.
Philadelphia	Protected cruiser.	Building	4,324	12 6-inch	Unarmored.
San Francisco	Protected cruiser.	Building	4,083	12 6-inch	Unarmored.
Yorktown	Gunboat	Built	1,700	6 6-inch	Unarmored.
Petrel	Gunboat	Launched	800	4 6-inch	Unarmored.
Concord	Gunboat	Building	1,700	6 6-inch	Unarmored.
Bennington	Gunboat	Building	1,700	6 6-inch	Unarmored.
Vesuvius	Dynamite cruiser.	Built	725	3 15-inch dynamite guns.	Unarmored.
First-class torpedo boat.	Torpedo boat.	Building	99	8 automobile torpedoes.	Unarmored.

The reader of these pages will be interested in a list and description of the new naval vessels completed during the last five years or now building, which we compile in part from the Report of the Secretary of the Navy, made December 1, 1888. The guns of the main batteries referred to in the table are all breech-loading rifles. Besides the main batteries, each vessel will be equipped with a secondary battery, which in nearly every ship will consist of several small rapid-fire guns, from 6-pounders down, revolving cannon, and from two to four Gatling guns.

In addition to the seventeen vessels named in the table and the five monitors, the building of a coast-defence vessel of 4000 tons' displacement, to be provided with armor 16 inches thick, was authorized by Act of March 3, 1887. The plans and specifications for this vessel have been completed, and bids for its construction were opened on April 3, 1889.

The Act approved September 7, 1888, provides for two steel cruisers of 3000 tons' displacement each, one steel cruiser of 5300 tons, one armored cruiser of 7500 tons, three gunboats or cruisers of not over 2000 tons each, and one steel practice vessel of 800 tons. The plans for these vessels are now being prepared.

Five other vessels were ordered by Congress in the Act approved March 2, 1889, and the Secretary of the Navy has directed the proper officials to prepare plans for their construction. The new vessels include one armored steel crusing monitor, of not less than 3000 tons' displacement, to cost, exclusive of armament, not more than $1.500.000; one cruiser of the *Vesuvius* type, to cost not more than $450,000; two steel cruisers or gunboats of the most approved type, of 800 to 1200 tons' displacement, to cost, in the aggregate, exclusive of armament, not more than $700,000; and one ram for harbor defence.

When all the vessels enumerated above are completed, the United States will have a navy of 36 iron and steel vessels, all, excepting the five monitors, built on the most approved modern plans. This fleet will consist of 18 cruisers (including two dynamite cruisers and a cruising monitor), one despatch vessel, six gunboats, one torpedo boat, seven coast or harbor defence vessels (including the five monitors), two line-of-battle ships, and one training ship. Eleven ships of the fleet, including the monitors and two of the cruisers, will be armor-clad.

Besides all the above vessels the Government owns 13 single-turreted iron monitors, now out of repair. They were built during the civil war. Their sides are protected with armor five inches thick, and their turrets with armor ten and eleven inches thick. Each monitor is armed with two 15-inch smooth-bore guns, but with no secondary batteries. It is stated that these 13 monitors might be made available for coast defence if thoroughly repaired.

The other vessels of what may be termed the old navy consisted, at the close of 1888, of 8 unarmored iron and steel vessels, built in the years between 1844 and 1876, 28 wooden steam vessels, built in the years between 1854 and 1883, 10 wooden sailing vessels, built in the years between 1797 and 1862 (including the old *Constitution*, built in 1797), and 11 steam tugs of wood and iron. In March, 1889, three of the wooden steamers, the *Trenton*, *Vandalia*, and *Nipsic*, were driven ashore or on the reefs, in a hurricane at Apia, in the Samoan Islands. The first two were wrecked, but the *Nipsic* has since been floated.

Publications of the American Statistical Association.

Of the former publications of the American Statistical Association several are now out of print; the following, however, can be supplied upon application.

Collections of the American Statistical Association, Vol. I. (Parts I–III.) By Rev. Joseph B. Felt, LL.D. Boston, 1847. Pp. 596. Price $5.00.

Contents: Statistics of Towns in Massachusetts.
Heights, Latitudes and Longitudes of Eminences in Massachusetts above the Level of the Sea.
Latitudes and Longitudes of Objects whose Positions have been determined by Secondary Triangles.
Latitudes and Longitudes of Light-Houses in Massachusetts.
Statistics of Population in Massachusetts.
Statistics of Taxation in Massachusetts, including Valuation and Population.

History of the Progress and Population of the United States. From 1790 to 1870. By Edward Jarvis, M.D. Boston, 1877. Pp. 16. Price 25 cents.

(This paper was originally printed in the volume of the Transactions of the Eighth International Statistical Congress, in 1872.)

Financial Connection of the Use of Spirits and Wine with the People of Concord, Massachusetts. By Edward Jarvis, M.D. (Read before the Association, Oct. 20, 1882.) Boston, 1883. Price 25 cents.

Boston's Trade and Commerce for Forty Years, 1844 to 1884. By Hamilton Andrews Hill, A.M. Boston, 1884. Pp. 20. Price 25 cents.

Memorial of Edward Jarvis, M.D. By Robert W. Wood, M.D. Boston, 1885. Pp. 24. Price 25 cents.

Address DAVIS R. DEWEY, *Secretary*,
Institute of Technology, Boston, Mass.

PUBLICATIONS

OF THE

AMERICAN STATISTICAL ASSOCIATION.

The Association issues at least four publications annually. These will be sent to members of the Association on payment of the annual assessment of two dollars. Copies can also be purchased upon remittance of the advertised prices.

The following numbers have been published: —

No. 1. Statistics of Water Power Employed in Manufacturing in the United States. By GEORGE F. SWAIN, S.B. 75 cents.

Nos. 2, 3. Park Areas and Open-Air Spaces in American Cities. By E. R. L. GOULD, PH.D.

Key to the Publications of the United States Census, 1790–1887; with Occasional References to Other Statistical Works. By EDWARD CLARK LUNT, A.M. $1.

No. 4. Life Insurance in the United States. By WALTER C. WRIGHT, ESQ.

Review of Reports of Bureaus of Labor Statistics for 1887. By PROF. RICHMOND MAYO SMITH.

Index to Reports of Bureaus of Labor Statistics for 1887.

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The Presentation of Statistics in the Finance Reports of the Several States. By PROF. E. R. A. SELIGMAN, PH.D., Columbia University.

Railway Statistics. By PROF. ARTHUR T. HADLEY, Yale University.

Reports of City Controllers. By HENRY B. GARDNER, PH.D., Brown University.

Commercial Statistics. By A. C. STEVENS, ESQ., Bradstreet's, New York.

Statistics of Public Lands of the United States. By ALBERT BUSHNELL HART, PH.D., Harvard University.

Prison Statistics. By ROLAND P. FALKNER, PH.D., University of Pennsylvania.

Cost of Wheat Production. By EDWARD ATKINSON, A.M.

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